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REVIEW ARTICLE OPEN ACCESS

A REVIEW ARTICLE ON CHRONIC COUGH WITH AYURVEDIC AND MODERN APPROACH

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ABSTRACT:

Coughing is the intrinsic defensive reflex mechanism to prevent airway from external irritant and aspiration. Cough is the most common symptoms experienced by patients in day to day OPD and till the diagnosis and its treatment challenge for many physician due to variety of causes. The exact prevalence of cough has unable to proved. Chronic cough significantly influence the quality of life of patients. '*Kasa*' is the disease explained in *Ayurvedic* science in which most of the presentation resembles 'Cough' in modern science. Cough is the symptoms in various diseases and it also found independently. Chronic cough is considered to be cause due to respiratory tract infection, COPD, Bronchial Asthma, GERD(gastro-esophageal reflux disease), post-nasal drip.In *Ayurveda* there is detailed description of pathogenesis and management of *Kasa*. According to *Ayurveda* various etiological factors causes imbalance in *Dosha(Vata,Pitta, Kapha)* which lead to disease *kasa*. This article discuss the etiology, symptoms, pathogenesis and management of *kasa*(cough) with *Ayurvedic* as well as modern perspective.

Keywords: *Kasa*, cough and *Dosha*, pathogenesis, management.

INTRODUCTION:

Cough is an explosive expiration that provides a normal defensive mechanism for clearing the tracheobronchial tree of secretions and foreign material.[1]Coughing is an intrinsic defensive mechanism against external inhaled stimuli. Chronic cough is significantly impact the quality of life of patients and associate with social and psychological burden[2]Cough reflex is produce in response to infectious agent or irritant external stimuli.[3]In a study conducted in rural India in 2002 on a population of 2275 children's age group 1-15yrs, in which chronic recurrent dry cough was found in 1.06%.[4] The survey study conducted in Europe involving 1120 participants has noted that only 53% had achieved a diagnosis, of the 70% of the respondents who had ≥three consultations for chronic cough. Most of the respondents judged the treatment as having limited or no effectiveness. Around 70% of patient in India with complaint of cough undergo with empirical treatment without diagnosis.[5]. The role of environmental trigger is the very important factor in the pathogenesis of chronic cough. It mainly depends upon air pollutant level. While the air pollution level is higher in Asia , chronic cough is more prevalent in Europe and America.[6]*PranavahaSrotas*(~Respiratory system) is a vital system of the body and although this system is more susceptible to allergens, smoke, pollutants and infections. *Kasa*(~Cough) is one of the disease explained in *PranavahaSrotas*(Respiratory System) in which most of the presentations resemble ofRespiratory tract diseases. In the pathogenesis of disease *Kasa,* the downward movement of *Vata* is obstructed by *Kapha Dosha*, its normal course is reversed and it moves up to fill all the openings in the head and follow the attack of cough.[7]Since *Kapha* is the main culprit in aggravation of *Kasa* and *Kapha* is the dominating *Dosha in Balyavastha* (~during childhood), the incidence is more in this age group. Pediatric age group is more vulnerable because of anatomical and physiological peculiarities (hypertrophied lymphoid tissues, mucous hyper secretion, peculiarities of Eustachian tube, etc.), immunological considerations (first exposure, immature immunological defenses, etc.), and social factors (attending school, improper food and eating habits,[8]Patient with chronic dry cough has major physical, social and psychological consequences. Treatment options are limited and billions of money spent on each year on OTC(over-the-counter) medication for cough and cold medications. In order to develop treatment for cough is the significant challenge for Medical and

pharmaceutical profession.[9]*Ayurvedic* literature has many drugs which act on *Kasa*(~Cough) and respiratory tract infection. *Kasahar Dashemani (combination of 10 herbs)* is one of the example of drug which act on *kasa* as well as act immunomodulator[10]

The aim of this review article is to provide research and analysis on existing modern literature facts on chronic cough and *Ayurvedic* literature on *Kasa*.

OBJECTIVE OF STUDY:

1. To study the etiology of *Kasa*(Cough)
2. To study the pathophysiology of *Kasa*(Cough)
3. To study the management of *Kasa*(Cough)

METHOD:

This article will discuss the etiology and pathophysiology of the cough, along with recent study in the field of cough, highlighting some of the diagnostic and management challenges. In this review article, PUBMED and Google scholar was searched using medical subject heading terms like 'cough', 'chronic cough', 'chronic dry cough', 'causes of dry cough', 'etiology of dry cough', 'mechanism of dry cough', 'diagnosis of chronic cough', and 'chronic cough management guidelines'. Also, a critical search for classical *Ayurvedic*textbooks and any references from these studies that were related to study were obtained.

Etiology of Cough :

Cough can be cause by different respiratory and non respiratory conditions. In *Ayurvedic Samhita* (Literature) the causes of *Kasa*(Cough) are as below,[11]

1. Dust particle
2. Heavy exercise
3. Eating dry foods
4. Obstruction in respiratory tract
5. Aspiration of food particle in respiratory tract
6. Stopping of natural urges

Other causes by modern prospective are as below

The etiology of a cough is based largely on the duration of a cough whether it chronic or acute. The risk factors for cough in an Indian perspective include *bidi* smoking, outdoor air pollution, and biofuel.Upper respiratory tract infection, post nasal drip syndrome, upper airway cough syndrome, COPD, Asthma, pneumonia, gastroesophageal reflux disease(GERD), mediastinal tumors, pleural disease, interstitial lung disease, use of ACE Inhibitor, psychological and unknown cause.[12]

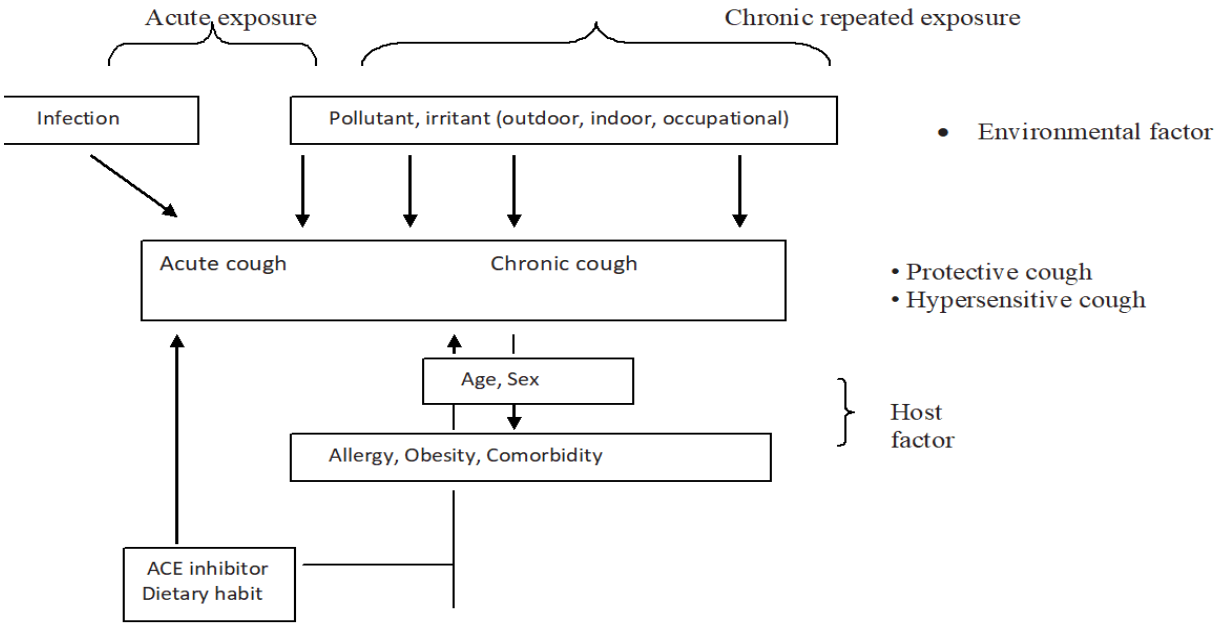

Fig.1: Pathophysiology of *Kasa*(Cough)

***Ayurvedic* perspective :**

Kasa is a disease explained in *Ayurveda* which resemble cough in modern medicine. In the pathogenesis of disease *Kasa*, vitiated *Kapha* obstructs the free flow of *Prana Vata* in *Kantha(Throat)* and *Uras.(Chest)*[13] Since *Kapha* is the main *Dosha* in production of *Kasa* and *Kapha* is the dominating *Dosha in Balyavastha* (during childhood), the incidence is more in this age group.

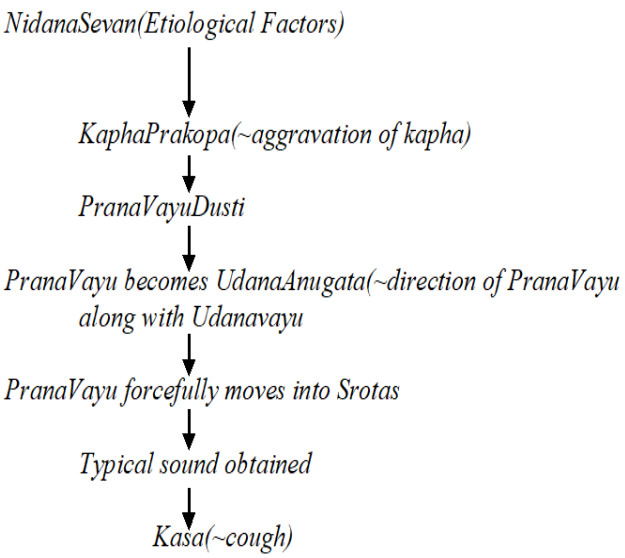

Fig.2: Samprapti of Kasa

Mechanisms of chronic cough:

The lungs are being protected due to coughing from injury and infection by clearing large bronchial airways of accumulated secretions and foreign material. The cough reflex is stimulated by cough receptors through motor nerves which transmit signals from cough receptors to the medulla of central nervous system (CNS). Cough receptors are located mainly on the posterior wall of trachea, pharynx, almost throughout the respiratory tract and alsoin the outside pulmonary sites

including the pleural layers and pericardium, auditory canals, nasal sinuses, stomach, and diaphragm. Activation of this cough reflex through cough receptor stimulation by complex inflammatory stimuli. In general, coughing is a defensive mechanism and characterized by expulsion of air through respiratory passage. However, cough reflex can be stimulate and suppressed byvoluntarily. Stimulation of the peripheral sensory nerves is the first step that drives resultant cough. These sensory neurons can be divided into two types:[13] Those with chemosensitive nociceptors-the transmission mechanism in these neurons is controlled by transient receptor potential cation channels, especially the transient receptor potential vanilloid 1 and ankyrin 1 (TRPV1 and TRPA1).[14] The other type of sensory neurons are those that have low-threshold mechanosensors. These receptors react to touch-like mechanical stimuli, but are not chemically reactive, and therefore, do not respond to the capsaicin test.[14] The transmission in these neurons occurs through myelinated nerve fibers. Both these sensory afferent pathways finally terminate at the brainstem, at the nucleus of the solitary tract, and the spinal trigeminal tract. Second-order neurons from the solitary nucleus and the trigeminal nucleus are connected to neurons of the brainstem and the spinal respiratory circuit, which coordinate the efferent cough response.[15]

The Causes of Cough –

Nidana(etiology) of Kasa mentioned in the classics can be categorized as Samanya(General) and Vishesh Nidan(Specific). Samanya Nidana mentioned by Acharya Sushruta and Acharya Madhava are Dhoom,(polluted air) Raja(dust particles), Vyayama(exercise), Rukhsya Anna Sevan(eating non oily foods), Bhojan vimargaman(food aspiration), Kshavathu-vegavarodh(voluntarily stopping of sneezing act)[16]

Cough can be caused by different respiratory and non-respiratory conditions. Some common causes of cough are as below

1. Viral infection of URTI(upper respiratory tract infection)
2. Post nasal drip syndrome
3. GERD(Gastro esophageal reflux disease)
4. Cough-variant asthma
5. Eosinophilic bronchitis
6. Pleural disease
7. Mediastenal tumor
8. Interstitial fibrosis
9. Use of ACE(Angiotensive converting enzyme) inhibiter
10. Psychogenic and idiopathic cough

11. Hypersensitive cough syndrome[17]

While evaluating the cough, most important characteristic is chronicity. The most common causes are bacterial and viral upper respiratory tract infections followed by pneumonia, aspiration, cardiogenic pulmonary oedema. The cause of acute cough is readily apparent in most other patients because of associated sign and symptoms of infection or heart failure. Primary manifestation of cough due to pulmonary embolism is difficult to diagnosed.

Chronic cough is cough that last more than 3 weeks. The most common causes of chronic cough are tobacco-related chronic bronchitis followed by postnasal drip, occult asthma, and gastroesophageal reflux. Most of patients who present for evaluation of chronic cough have one of these etiologies. Clues to these diagnoses include resolution of cough following cessation of smoking; nasal discharge, sinus tenderness, and secretions in the posterior pharynx; expiratory wheezing on lung auscultation; and regurgitation and heartburn. [18]

Table-1.Historical Clues Important in the Diagnosis of Chronic Cough.

1	Tobacco use
2	Recent change in the pattern or character of cough
3	Presence and quantity of sputum production
4	Hemoptysis
5	Heartburn
6	Improvement with antireflux therapy
7	Environmental and occupational inhaled exposures
8	Allergic and atopic histories
9	Nocturnal cough
10	Sinus symptoms
11	New drug exposure, especially angiotensin-converting enzyme (ACE) inhibitors and - blocking agents
12	Substance abuse, especially crack cocaine

Types ofKasa: (According toBrihatrayeeandLaghutrayee)

1) Vataj Kasa

2) Pittaj Kasa

3)Kaphaj Kasa

4) Kshaja Kasa

5) Kshtaja Kasa

Kshaja Kasa, Kshtaja Kasa are produced by aggravation of all of the 3Doshas

Table 2: Showing symptoms Kasa[19,20]

VatajKasa	**PittajKasa**	**KaphajKasa**
Hridayashoola(chest pain)	Mukha-kanthaShushka(dry-ness of Mouth and throat)	NisthivateghanamKapha(secretion of sticky mucous)
Murdhashoola(Headache)	Jwara(fever)	KantheKandu (itching in throat)
Parshwashoola(pain in flanks)	Aruchi (anorexia)	Utklesh(Nausea)
Udarshoola(abdominal pain)	Chardi(vomiting)	Peenasa(coryza)
Shankhashoola(pain in temporal region)	Urovidah(burning in chest)	Murdhashoola (Headache)
Kasatishushkamev(Dry cough)	Pandu(anaemia)	Mandagni (low digestive power)
rasaktvegastu(continuous bouts of cough)	Pitta Nisthivan(Yellow Spu-tum)	Guruta(heaviness in body)
Bhinnaswara(Hoarseness of voice)	Trishna(thirst)	Vaman(vomiting)
KsheenaBala(Loss of strength)	Bhrama(vertigo)	

History:

As with any illness, taking full and detailed history and appropriate physical exam is the most important aspect of any medical evaluation. The diagnosis of a cough is made by clinical examination and observation. A cough is a symptom as well as independent disease. Many patients came in OPD for evaluation of the secondary or underlying effects of cough rather than a cough itself. Important components of the history-taking should include:

- Onset of cough, acute or chronic
- duration
- smoking
- Use of angiotensin-converting enzyme inhibitors
- Weight loss

- Work place, Occupation
- Diurnal variation
- Relieving factors
- Aggravating factors
- Productive with sputum or nonproductive, if productive, what is the color of sputum
- Associated hemoptysis
- Associated fever
- Dyspnea
- Presence of an upper respiratory tract infection at the onset of a cough

Otherwise, etiological factors should be evaluated for any coexisting illness, or compounding factor of a cough. Specific findings that are common and may be found with any complaint of a cough include weakness,insomnia, lifestyle changes, bodyache, hoarseness of voice, excessive sweating , urinary incontinence, giddiness, headache, subconjunctival hemorrhage, inguinal herniation, or gastroesophageal reflux. The specific complaints should tailor the focus of a clinical, physical exam and diagnostic workup to evaluate the exact etiology.[21]

Evaluation of Cough:

An acute and subacute cough requires no diagnostic studies and should be treated symptomatically unless there is secondary suspicion of an insidious pathology. X-ray of chest may be appropriate if a cough is determined to be severe or if the patient appears extremely ill.

A chronic cough may require diagnostic measures to include a chest radiography and complete pulmonary function testing. Bronchoscopy with direct visualization of vocal cords, trachea, and other airways should be rule out any vocal cord tumor or lesion and endotracheal or endobronchial mass or obstruction. Bronchoalveolarbiopsy or lavage may required for microbiological and cytological studies. An echocardiogram may be indicated for cardiac function testing. CT scan of the chest may be indicated for fibrotic changes and anatomical analysis. Gastroesophageal studies may be indicated, for GERD, aspiration, acid peptic disorders. patients having obstructive sleep apnea, cough is generally at night in that case sleep study may be required for confirmation.Neurogenic cough are diagnosed by following criteria:

1. constant cough bout during the day
2. Non-productive cough
3. vocal fold paresis on the laryngeal examination
4. Laryngeal electromyographicstudy for confirmation of paresis
5. Complete resolution of symptoms with appropriate treatment

Treatment / Management

***Ayurvedic*View :**

Chikitsa(Treatment):- In treatment of *Kasa* there is a need of different mode of approaches at different stages. Most of time multi treatment protocol has to be adopted .[22]

Nidana Parivarjana(avoid causes):- It is most important aspect of treatment. Person with *Kasa* has to avoid triggering factors like smoking, dust inhalation etc. some time person has to make some modification in his occupations to avoid these *Nidana* like mask wearing; avoiding air Conditioned environment etc.Patient should be more conscious duringcold/winter seasons and during travel to cold atmosphere.

Samshamana(pharmacotherapy):- There are many single drugs, *Kastoushadhi*(Herbal Drugs) and *Rashushadis*(Minerals drugs) are indicated for *Kasa*. These have *Katu ,Ushna, Tikshna, Sukshma, chedana, kapha nissaraka(expelling kapha), kasagnaguna. Trikatu, Pippali, Kantakari Avaheha, Agastya Haritaki Avaleha* are beneficial in *Kasa. Pippali* and *Agasthya Haritaki Yoga* can be used as *Rasayana* in *kasa*.

Shodhana(Purification):- The first line of *Shodhana* in *Kasa* is *Vamana(medicated emesis). Vamana* will expel the *Dushita Kapha* and relive the *Aavarana* to *Vata* giving more and effective result in *Kasa*. The *Virechana*(medicated purgation) can be planned in *Vata, Pittanubandha*. Here *Vata* should be controlled to relieve *Vedana*(Pain) in *Urah*(chest) and *Parshva*(Axial). *Nasya*(medicated oil administered by nose)*Karma* is helpful because the *Sthnasamshraya* is in *Urdhvajatrugata*(above neck). *Virechana* and *Nasya* have minimal role in *vegkalen* and *Bahudoshajakasa*. In Avasthika Kala these can be adopted as per the Yukthi of Physician. If *Bahudosha* and *Amashyagata Kaphaja Lakshana* are noticed *Sadhyavamana* can be adopted rather than classical *Vamana*. *Kavalagraha(Medicated gargaling), Dhumapana(Medicated smoking)* are also helpful in condition of *Kasa*. After the *Vamana Tikshana Dhumapana* will helpful in *Kasa*.[22]

Modern View :

Most of the time acute cough should be treated symptomatically for relief. This includes supportive measures of over-the-counter medicines for cough and cold also home remedies like honey. However, many over-the-counter medicines have limited or no clinical benefit over placebo. Cough suppressants may be used to suppress the cough reflex, and expectorants may be used when excessive mucous secretions are determined to be the primary issue to increase mucus clearance. The most commonly

usedcough suppressant is dextromethorphan, and the most common expectorant is guaifenesin. It is important to remember, that cough itself is a defense mechanism and plays an important part in immune systems. Therefore, suppressing the cough reflex may impacts on the recovery time of illness. Many chest physician doesn't recommend the use of centrally-acting cough suppressants. Whenever an infectious etiology is suspected, sputum culture should be attempted, and antibiotic therapy tailored to the pathogen. In chronic infectious upper respiratory etiologies, prolonged antibiotic therapy with an appropriately selected drug agent is necessary. Amoxicillin/clavulanate 625 mg orally twice a day for 3 weeks is the first line of treatment. However, alternative therapies may be used, including:

- Cefpodoxime 300 mg by mouth twice times a day for 3 weeks
- Cefuroxime 500 mg twice a day for 3 weeks
- Cefprozil 500 mg twice a day for 3 weeks
- Clarithromycin 500 mg twice a day for 3 weeks
- Gatifloxacin 400 mg by mouth two times daily for 3 weeks
- Levofloxacin 500 mg by mouth once a day for 3 weeks
- Moxifloxacin 400 mg by mouth twice a daily for 3 weeks

Inhaled bronchodilator may be used for symptomatic relief in urgent situations. Treatment of a chronic cough should be according to etiological factors and not to suppressing the cough. If a patient is taking an (ACEI)angiotensin-converting enzyme inhibitor, this medicine should be changed, and start other antihypertensive drugs.Inhaled corticosteroids or anticholinergic drugs may be indicated in reactive airways disease. Cardiac origin cough should be treated as per cardiology recommendations. Gastroesophageal reflux should be treated aggressively by avoiding predisposing reflux substances, including fast foods, spicy foods, tea, alcohol, and tobacco. Furthermore, to prevent aspiration, patients should elevate the head of the bed and not eat for several hours before bedtime. Medical therapy should include a proton pump inhibitor.

Management of chronic neurogenic cough is different than other neuropathic conditions. Tab. Tramadol 25mg is indicated when no laryngopharyngeal reflux, or amitriptyline 10 mg at bedtime.gabapentin 100 mg four times per day is indicated in laryngopharyngeal reflux is present.Typical combination therapies include gabapentin with a small dose of amitriptyline at bedtime. Pregabalin and

baclofen are choices used in special situations.[23,24]

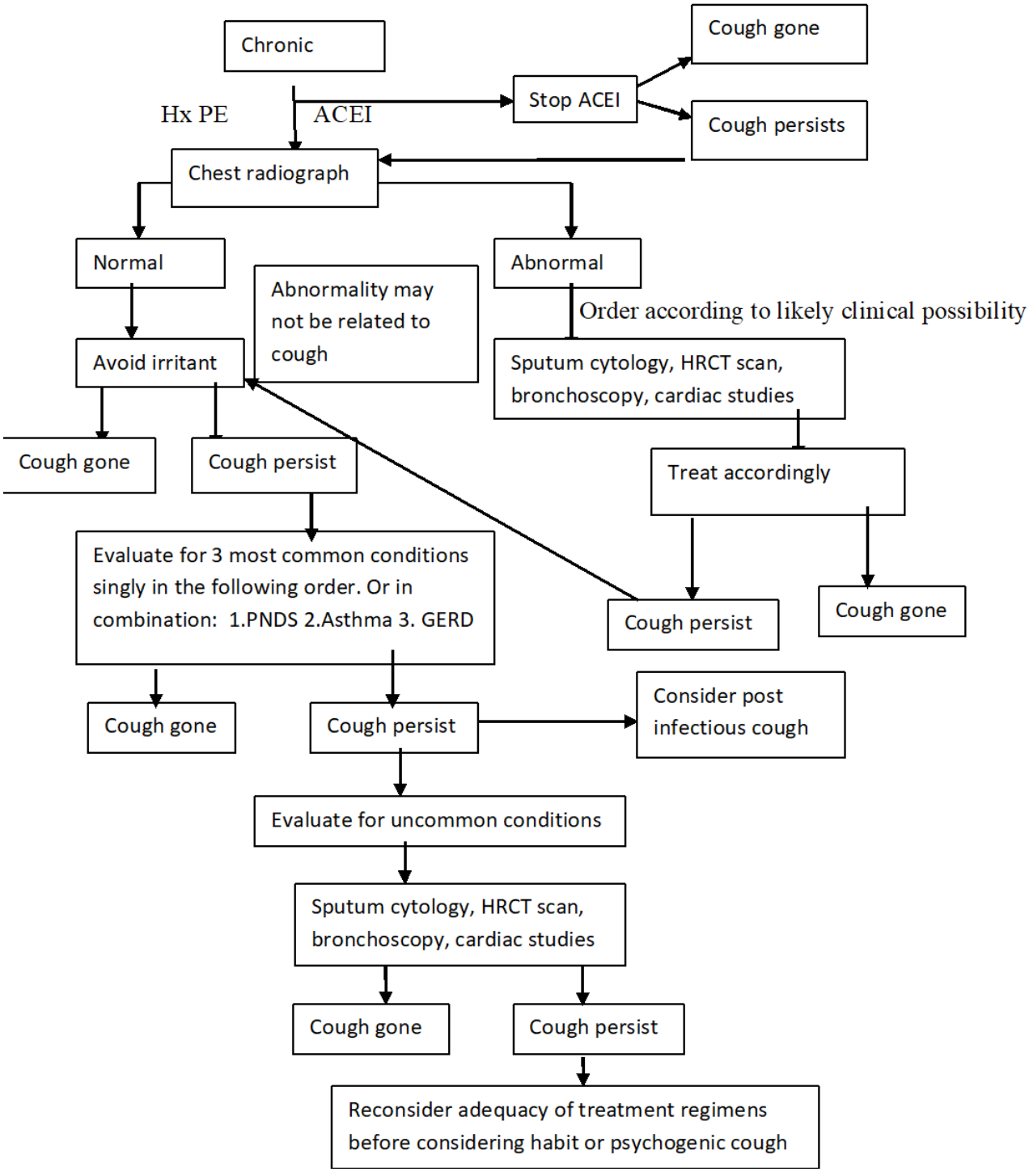

Fig- 3 initial evaluation and management of patients with chronic cough. ACEI angiotensin converting enzyme inhibitor, GERD Gastroesophageal reflux disease HRCT, high-resolution computed tomography; HX, history; PE, physical examination; PNDS, postnasal drip syndrome.

CONCLUSION:

'*Kasa*' is the disease described in *Ayurvedic* text is much resembles 'Cough' in modern science. The diagnosis, investigation and treatment of chronic cough is a rewarding and generally fruitful undertaking. By systematic

approach based on a careful history, investigations and treatment, dramatic improvements in quality of life. The main reason for misdiagnosed or undiagnosed is a lack of understanding of the etiology of cough, particularly when it arises from sites outside the respiratory. So precise diagnosis of chronic cough helps in planning of the treatment protocol for radical alleviation of the condition.

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