

Svasa: Different Patterns of Breathing Abnormalities

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Abstract - The condition **Svasa** is described in Ayurvedic text as a difficulty in breathing of any cause and divided into five types. A particular type represents particular stage of abnormal respiration. **Mahasvasa** and **Urdhvasvasa** are compatible with **Kussmaul Respiration** and **Central Neurogenic Hyperventilation** respectively. **Chinnasvasa** includes the **Cheyne-Stokes Respiration** and **Ataxic Respiration**. Prognosis of these conditions is poor. **Tamakasvasa** includes all the diseases characterized by **Bronchial Asthma**. **Kshudrasvasa** which is an initial stage of the other four types of **Svasa**, is similar to **Dyspnea on Effort**. Especial consideration on **Kshudrasvasa** prevents serious life threatening disorders.

Svasa, a major pathological condition mentioned in the classical texts of Ayurveda, comprises different patterns of breathing abnormalities of organic defects. Breathing, a key physiological function, is controlled by integrated complexities of biochemical, mechanical and neurological factors. The severity and pattern of breathing abnormalities depend upon the degree of defect of respective organs. **Mahasvasa** **Urdhvasvasa** **Cinnasvasa**, **Tamakasvasa** and **Kshudrasvasa**, are the five types of breathing abnormalities in the descending order of their seriousness. **Svasa** is considered, in the context of Ayurveda, to be the most serious condition, causing immediate death.

The term **Svasa** is derived from a Sanskrit root "**Svas**" meaning aliveness (**Svas - Jivane**). Breathing is the symbol of life and it is a result of series of mechanical and biochemical reactions. The sense of the term "**Svas**" represents whole process of respiration.

Breathing pattern abnormalities may arise as a result of defective regulation of respiration of various causes. Respiration is a rhythmic function consisting of two phases; i.e. inspiration and expiration. The rhythmic impulses, under the control of discharges from brain, of motor neurons that innervates the respiratory muscles

produce spontaneous respiration regulated by neural and chemical factors. The voluntary and autonomic controls on respiration are mediated via the neural factors. Cerebral cortex, where the voluntary system is located, discharges the impulses to the respiratory motor neurons through corticospinal nerves. Autonomic system, which is located in medulla and pons, provides impulses to the respiratory motor neurons. The area in the medulla that is responsible for respiration is called respiratory center. Pneumotaxic center located in the pons modifies the discharges from medulla. The chemical factors, which regulate respiration, include mainly PCO_2 , PO_2 and H^+ concentration of blood. The effect of changes in blood chemistry mediates via respiratory chemo-receptors located in carotid, aortic bodies and cells in the medulla. Normal PCO_2 , PO_2 and H^+ concentration of blood is maintained by a number of biochemical reactions occur mainly in respiratory system, kidney and blood. Any defect of these systems, which are potent enough to alter the chemistry of blood, affects the regulation of respiration resulting **Svasa** or breathing abnormalities. It may occur as a complication or characteristic feature of a disease.

In the context of Ayurveda, **Svasa** is categorized under Mahavyadhi and is further divided into five types on the basis of its clinical manifestation and

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severity. Mahasvasa, Urdhvasvasa and Chinna svasa occur as a result of respiratory failure at the terminal stage of the patient suffering from severe diseases of brain stem, cardiovascular system, urinary system and other metabolic disorders such as metabolic acidosis.

Mahasvasa:

Mahasvasa is characterized by deep sighing, a long drawn inspiration, which is accompanied by stertorous or stridor. The sound of stertorous breathing, during the phase of inspiration, occurs due to the paralysis of soft palate causing it to vibrate as the air passes into the throat and the stridor due to partial paralysis of larynx. Unconsciousness, opened eyes and mouth, nystagmus (involuntary rhythmic oscillation of eyes), inability to speak, loud expiration and generalized weakness are the additional characteristics of the condition. **Kussmaul Respiration (Acidotic Respiration)** is also a similar breathing abnormality, described in modern medicine, of deep sighing hyperventilation that occurs principally in diabetic ketoacidosis, uraemia, respiratory failure of other causes, in diseases of nervous system and in deep metabolic coma specially in hepatic and diabetic coma.

Urdhvasvasa:

Urdhvasvasa, the second most serious breathing abnormality, is characterized by deep sighing or long drawn of inspiration, which is not accompanied by stertorous or stridor. Presence of obstructed nose and mouth with secretions (phlegm or saliva), upward turning of eyes, nystagmus, visual hallucinations, intermittent unconsciousness, painfulness, paleness of the face and generalized weakness are the additional symptoms of the condition. **Central Neurogenic Hyperventilation** or pontine hyperventilation is the sustained, rapid, deep, regular breathing seen in patients with brainstem damages such as reticular pontine infarction, central brainstem dysfunction secondary to transtentorial herniation associated with intra or extra cerebral space occupying lesions. Deep sigh or yawns may

precede the development of this respiratory pattern.

Cinnavasa:

Cinna svasa, the third type of the breathing abnormality, is characterized by periodic breathing and severe pain in vital organs including heart, brain and kidney. Flatulence, excessive sweating, unconsciousness, painful bladder, tear filled eyes, redness of one eye; flaccid limbs and excessive weakness are the additional features. It occurs as a result of defects of organs, directly responsible in maintaining the life.

The periodic respiration and ataxic respiration can be directly compared with Chinnavasa. **The periodic Respiration** refers to alternating hyperpnoea and apnoea, which is called Cheyne-Stokes Respiration. Cheyne-Stokes Respiration, which is caused by the decrease in the sensitivity of respiratory center to carbondioxide, has a cyclical variation in the depth of respiration. It represents a phase of very deep rapid breath, a period of gradually deepening of respiration, a phase of slowly decreasing respiratory movements and rate respectively. Finally respiration becomes quieter and may cease for several seconds (apnoea) before the cycle is repeated. The apnoea occurs due to the lack of CO_2 in blood. During the phase of apnoea, the alveolar PO_2 falls and the PCO_2 rises. Breathing resumes because of hypoxic stimulation of carotid and aortic chemoreceptors and breathing stops until the alveolar PO_2 falls again.

Some patients of Cheyne – Stokes Respiration have increased sensitivity to CO_2 apparently due to the disruption of neural pathways that normally inhibits the respiration. In these individuals, CO_2 causes relative hyperventilation, which lowers the arterial PCO_2 , results in apnoea. The arterial PCO_2 again rises and the respiratory mechanism over-responds to CO_2 , leading to the cessation of breathing and cycles repeat. Prolongation of the lung to brain circulation time is another cause of periodic respiration in respect of patients with

cardiac diseases. Periodic respiration occurs in the presence of neurological diseases such as bilateral hemisphere dysfunction, lesions in the upper brainstem, coma of any cause and especially in chronic pulmonary diseases with carbondioxide retention. **The Ataxic Respiration** is the shallow halting respiration common in the diseases of the respiratory center in Medulla Oblongata and it is usually a pre-terminal event of the patient.

Tamakasvasa, which is the fourth breathing abnormality, occurs mainly in the diseases of respiratory system. It is characterized by the presence of shortness of breathing of airway hyperactivity (Asthma). It may occur in the defects of many causes of both upper and lower respiratory system. Difficulty in breathing is resulted with abnormal function of airways and excessive production of secretion in the respiratory tract. Dynpnoea, accompanies with rhinitis and wheezing. Symptoms are usually extensively shown, during the night and disturb the sleeping. patient speaks with great exertion. Some times upright position comforts the breathing slightly. Patient is inactive and feels helplessness, thirsty, sensation of choking or tightness of chest, neck and head. Cough is a predominant feature and expectoration provides temporary relief. Patient likes warm. In the cases of severe acute attacks, patient become unconscious intermittently due to cardiac arrest. Episodic attacks of shortness of breathing are the main symptoms of the condition. Eventually it may lead to Mahasvasa or Urdhvasvasa in the absence of appropriate management.

Tamakasvasa is further divided into two groups namely **Pratamakasvasa**, in which shortness of breathing is caused by dust, belching, indigestion and tolerating of natural urges, is followed by fever and coma. **Santamakasvasa** is caused by the psychological factors.

In modern medicine this breathing abnormality is known as **Bronchial Asthma**.

Bronchial Asthma is defined as bronchial hyperresponsiveness together with intermittent symptoms of wheezing, chest tightness or cough. The causes of asthma have not been fully identified but there is an abnormality in the control of bronchial lumen, particularly in the control of the bronchial muscles. Excessive narrowing in the air way is due to wide variety of stimuli, which have no effect on the airways in normal people. In atopic individuals they produce spasm of bronchial muscles, swelling of mucous membrane and excessive secretion of mucus. In severe acute asthma (Status Asthmaticus), many smaller bronchi become obstructed by mucus leading to alveolar hypoventilation, severe arterial hypoxaemia and cardiac arrest.

Bronchial Asthma is further divided into two sub types on the basis of their aetiology and pathophysiology. **Extrinsic Asthma**, which is caused by entrance of foreign bodies into the respiratory tract, is found in atopic individuals. Allergens are derived from dusts, pollen, mites, feathers, animal danders, fungal spores and certain foods and beverages. Previous exposure to these agents may produce a sensitivity, and further exposure to these allergens provoke antigen-antibody reaction resulting in secretion of biochemical substances, which induce bronchial constriction and inflammatory reactions in the bronchial wall. Asthma is aggravated by nonspecific factors such as bronchial irritations caused by tobacco smoke, acid fumes, infections, changes in the climate and exercise. Air way drying and emotional upsets can trigger the attack. Genetic factors also are thought to be associated with asthma in atopic subjects.

Kshudrasvasa is a controversial condition in Ayurvedic text. Kshudrasvasa is not particularly

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dangerous as the conditions stated above. It is a shortness of breathing on exertion but it can be aggravated due to inadequate consideration. Some Ayurvedic intellectuals consider it a normal physiological condition but it has been included in the section Svasa which is defined as a fatal condition. Kshudrasvasa occurs on mild exertion and it subsides on rest, does not make any defect in other systems or any pain or disorder in the sense organs at the moment of its existence. It may be the initial stage of future disease. Therefore it should not be considered as a normal physiological condition. Special investigations are required to find the causes of the condition for application of preventive measures. This condition can be compared with dyspnoea on effort. The dyspnoea on effort is a prodromal symptom of the diseases of cardiovascular system, renal diseases, metabolic disorders and anaemia etc.

In conclusion, a normal individual is not conscious of respiration until ventilation is doubled and breathing is not uncomfortable. According to the definition, dyspnoea is a breathing in which the subject is aware of shortness of breath. The consciousness of breathing and discomfort is not obvious until dyspnoea point is reached. According to the Ayurveda the condition "Svasa" includes all the diseases characterized by different patterns of breathing abnormalities. Each type of breathing abnormality provides guidance to detect the underlined diseases and defective organs. Mahasvasa, Urdhvasvasa and Cinnasvasa occur at the pre-terminal stage of the patients. Tamakasvasa may also cause sudden death specially in *Status Asthmaticus*. The prognosis depends on the causes of the diseases and severity of the defect of respective organs.

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