

## A BRIEF PHYSIOLOGY OF RESPIRATION IN AYURVEDA WITH MODERN VIEW: A REVIEW ARTICLE

Ashish Chandrawanshi<sup>1</sup>, Gitanjali Sasmal<sup>2</sup>, Vinay Bhardwaj<sup>3</sup>

<sup>1</sup>P.G. Scholar, Department of Kriya Sharir, Shri NPA Govt. Ayurved College Raipur, Chhattisgarh-492010, India

<sup>2</sup>Reader and H.O.D. Department of Kriya Sharir, Shri NPA Govt. Ayurved College Raipur, Chhattisgarh-492010, India

<sup>3</sup>Reader, Department of Kriya Sharir, Shri NPA Govt. Ayurved College Raipur, Chhattisgarh-492010, India

Corresponding Author: [chandrawanshi1502@gmail.com](mailto:chandrawanshi1502@gmail.com)

<https://doi.org/10.46607/iamj2110022022>

(Published Online: February 2022)

Open Access

© International Ayurvedic Medical Journal, India

Article Received: 05/01/2022 - Peer Reviewed: 18/01/2022 - Accepted for Publication: 19/01/2022



### ABSTRACT

Respiration has been recognized as the symbol of life. Respiration occurs in two stages inspiration (*Nishwas*) and expiration (*Uchawas*). Inspiration is the process through which the air enters the lungs from the atmosphere. Expiration is the process through which the air leaves the lungs i.e., expired out. In Ayurveda, the function of *Prana Vayu* is held responsible for the process of respiration in the human body. The channels or tract (*Srotas*) in which *Prana Vayu* flows are called *Pranavayustrotas*. *Prana Vayu* is compared with atmospheric oxygen which is important to hold out the vital function of life. Description of different parts of respiratory tract organs and functions are found in the description of *Pratyangasharir*, *Srotas*, *Kosthanga*, *Prana Vata*, *Udanavata*, *Raktadhatu* and diseases of *Nasa*, *Kantha*, *Pranava-srotas* etc. which suggest the description clinical physiology of respiration. The act of breathing is the physiological function of *Prana Vata*, and *Udana Vata* and it is related to *Pranava-srotas*. *Sharandhar* has described both external respirations i.e., the mechanism of ventilation, transport of gases and internal respiration i.e., utilization of oxygen by the cells to produce energy. The respiratory tract can arise due to important diet, seasonal changes, polluted air, and lack of exercise. Respiratory health can be improved through a controlled diet. Avoid fried food and having light breakfast and dinner are the best ways to be followed.

Drinking lukewarm water helps to break chest congestion. Herbs like *Pippali*, *Guduchi*, *Shati* and *Pushkarmula* etc. are a few of the lungs supporting herbs. Warming the body through exercise is another way for maintaining respiratory health. *Yoga, meditation and Pranayama*, in specific, cleanse the respiratory tract; strengthen the lungs and supports healthy lung function.

**Keywords:** *Nishwas, Ucchawas,*

## INTRODUCTION

Respiration is an important physiological process necessary for the survival of living beings. The main functions of respiration are to provide oxygen to the tissue and remove carbon dioxide. As most tissues in the body survive on oxygen to produce energy, there is a requirement for a continuous supply of oxygen and the removal of carbon dioxide. In Ayurveda, the process of respiration is attributed to the functions of *Prana Vayu*. In some places, *Prana Vayu* is compared with the inspiration of atmospheric air, while *Apana* is said to be the representative of expiratory exhalation of accumulated carbon dioxide. *Prana Vayu* is inspired through *Pranavahasrotas* during inspiration. *Pranavahasrotas* is understood as a respiratory system in context to *Sthula Srotas* since it takes in the *Prana Vayu* as a nutrient from the external atmosphere through the respiratory tract and its main functional contribution in the body is to provide oxygen.

### PHYSIOLOGICAL ANATOMY OF RESPIRATION SYSTEM

In *Ayurveda*, the functions of *Prana Vayu* are held responsible for the process of respiration in the human body. According to *Charak*, the *Prana vayu* is located in *Murdha* (head), *Ura* (chest), *Kantha* (trachea, larynx), *Jivha* (tongue), *Nasa* (nose& nasal cavity). The organs of the respiratory system include the nose, nasal cavity, pharynx, larynx, trachea, bronchi & their smaller branches & the lungs which contains the terminal air sacs or alveoli.

**NOSE:** - First organ in this system is the nose. Ayurveda considers the nose to be a door towards the head. The nose is also important for its osmotic perception. It is therefore situated at the very beginning of the respiratory as well as digestive tract<sup>1</sup>. The only externally visible part of the respiratory system, the

nose lies in the middle of the cranium & mouth. Posterior communicates with the pharynx. It is the sense organ of smell / olfactory receptors (*Ghranendriya*).

**PHARYNX:** -pharynx is a tube having 12-14 cm long from the base of the skull that lies behind the nose and mouth. By the same methods, the air is further warmed and moistened while passing through it<sup>2</sup>.

**LARYNX:** -larynx is also called the "voice box" lies in front of the laryngeal part of the pharynx at the level of the 3<sup>rd</sup> to 6<sup>th</sup> cervical vertebrae. Here the air is further moistening, filtered and warmed and it ensures that food passes into the oesophagus and not into the lower respiratory passages<sup>3</sup>.

**TRACHEA:** -Trachea is known as the windpipe bifurcates into right and left each one bronchus going to the lung. As it is made from the cartilages hence it prevents the collapse of the tube when the internal pressure is lesser than intra-thoracic pressure<sup>4</sup>.

**BRONCHI:** - The trachea is divided into 2 parts – viz. left & right bronchi at about at the level of 5<sup>th</sup> vertebra of the thorax in the mediastinum. This divide and re-divide by 23 times. Bronchioles start from 4<sup>th</sup> upto 16<sup>th</sup> division. Up to the 16<sup>th</sup> division, there are no alveoli. So, this part does not take part in respiration. This constitutes anatomical dead space. The 16<sup>th</sup> division of this airway is called terminal bronchioles<sup>5</sup>. After entering the lung each primary bronchus divides into secondary, tertiary bronchi and bronchioles and terminal bronchioles<sup>5</sup>.

**THE ALVEOLI:** - The remote small ends of bronchioles are further subdivided into the minute cavities called alveoli which end again at the alveolar sac in the lungs. This portion of the lung is directly responsible for the exchange of inhaled gases<sup>7</sup>. Two types of cells are called Pneumocytes line alveoli. They are referred to as Type I and type II cells. They rest on a

thin basement membrane. Type II Pneumocytes produce a surfactant. Other types of cells like mast cells, macrophages and Clara cells. Lymphocytes and plasma cells are also present<sup>6</sup>.

**LUNGS:** -In *Ayurveda*, *Acharya Sushruta* describes the lungs to be produced from the foam of the blood, whereas in modern medicine it is described as two lungs one lying on each side of the midline of the thoracic cavity. They are cone-shaped and described as having an apex, a base, costal surface and medial surface.

**THE PLEURA:** -The pleura is a thin, double-layered membrane that covers the lungs it produces pleural fluid, a lubricating serous secretion that remains between the two layers and the lungs easily glide at respiration.

#### SWARUPA OF PRANA VAYU

According to *Charak*, all the life activities of the body are performed by the normal *Vata* which is said to be the very-life of living beings. Diseases are caused by that very *Vat* when morbidities and even cessation of life are caused by such *Vata*. *Susruta* said that *Bhagavan* (venerable) *Vayu* is a self-born divinity, independent, everlasting, all-pervading functional agency in all things (living and Non-living) and adored by All the worlds; he is the cause for maintenance, birth and death of living beings, imperceptible but knowable by his action.

#### SITES OF PRANA VAYU

Head is the principal location of *Prana Vayu*. By *Charak*<sup>7</sup>, the seats of *Prana-Vata* are the head, chest, throat, tongue, mouth and nose; whereas *Susruta* said that *Vayu* which moves in the mouth, is known as *Prana*<sup>8</sup>.

#### FUNCTIONS OF PRANA VAYU

- 1 *Susiana*- To forcefully clear tracheal and pharyngeal mucous-sputum expulsion.
- 2 *Kshavathu*- To sneeze-expulsion of accumulated intense prana and udana through the nose.
- 3 *Udgara*- To belch-expulsion of gases abnormally through the mouth with noise.
- 4 *Nishwas*- Respiration
- 5 *Ahararasa*- Ingestion

6 *Budhiindriyachittadhrika*<sup>9</sup>- control on intellectual, heart, all sensory and motor organs, mind.

*Prana Vata* is located in *Murdha* i.e. head, it moves in zigzag manner i.e., moves in the chest, throat, ear, tongue, nose, supports the mind, heart, sense organs and intelligence, attends to expectoration, sneezing, belching, inspiration, and swallowing of food etc. Apart from this it also sustains *Prana* i.e., the twelve factors which constitute life and also control their respective functions. Again, *Sharngadhara* has also mentioned that it is responsible for *Swashadi karma* (respiration). *Vatadosha* has got a very important role in the maintenance of the body as well as life, though *Vatadosha* is not only respiration, but even respiration is also more significant from of external air, which is felt by a common man and performs various activities in the life. The respiratory system eliminates carbon dioxide from the blood (and from all the tissues of the body) which is generated by cellular respiration, while it replenishes the oxygen in the body<sup>10</sup>.

#### MULSTHANA (ORIGIN) OF PRANAVAHA SROTAS

The *Mula* of *Pranavahasrotas* are *Hridaya* and *Maha srotas*. Here a *Mula* indicates that the organs mentioned as *Mula* of a *Srotas* are capable of best output strength and efficacy or even influence that particular *Srotas*<sup>11-12</sup>.

#### FUNCTION OF PRANAVAHA SROTAS

The concept of *Srotas* is similar to the functional system indicated in the physiology of the living body. When organs carrying out the same function are working together, they collectively comprise a system. *Pranavahasrotas* deal with the inhaled flow of air. Since the heart is the principal organ of this system, all active entities working for the heart can be considered supportive of this system. Diseases of this system match respiratory disease hence it can be concluded that *Pranavahasrotas* indicates respiratory system. It clinically is observed that when the heart and the gastrointestinal system gets disturbed, respiratory symptoms appear without fail<sup>13</sup>.

## FORMATION OF PRANAVAHA SROTAS

When we think about the formation of *Pranava* *Srotas* it is essential to think about the elements responsible for the formation of organs including in *Pranava* *srotas* which is produced by *Rakta dhatu*. *Rakta* is one of the *Dhatu* from *Saptadhatu*s and it is also one of the *Prana* from *Dashapranayatana*. There is the main role of *Rakta* information of every organ of the body, so it is the creator of a few important organs of the body<sup>14-15</sup>. *Rasa dhatu* is colourless and consist of nutrients of seven *Dhatu* liquid while coloured *Rasa* when enters into *Raktavaha Srotas* liver and spleen gets red colour due to the action of *Ranjaka pitta*. *Raktadhatu* conducts *Prana* to every *dhatu*, every cell of the body. The air inhaled (*Ambarpiyusha*) during the process of respiration becomes vital *Prana* for the human body. This *Prana* along with *Rakta dhatu* is supplied to every organ, tissue and cell to perform the physiological activity. *Prana* is energy without which the body will not function. The body cannot survive without *Prana*. *Prana* and *Rakta dhatu* is a medium for the conduction of *Prana* hence life depends on *Rakta dhatu*. Therefore, haemorrhage or obstruction to blood flow can affect life so it is called *Jivana*. *Hridaya* is formed during the fourth month of fetal life which is the main site of *Pranava*srotas. It is also the main site of *Rasavaha* and *Pranava*srotas. In the circulation of *Rakta* and *Shvasa na* the *Hridaya* is functioning mainly and over it also effect of *Prana Vayu* and *Vyan vayu*. The organ *Hridaya* is made up of *Rasa*, *Rakta*, *Mamsa*, *Meda*, *Shukra* etc. *dhatu*s.

## SHWASA KRIYA: MECHANISM OF RESPIRATION & RATE OF RESPIRATION

In Ayurveda, the clear physiology of respiration is available in Ayurvedic and Sanskrit literature. In Yajurveda, it is mentioned that air (*vata*) in the form of *Prana* and *Apana* enters the *Nasik*. (“*Vatam-pranenaapanenasike*”: YAJ 15/12). It shows that *Prana* & *Apana* are the words used to indicate inspiration & expiration. *Shwasa Kriya* (Respiration) is a process that takes place from the first minute of birth to the last minute of death. This process involves two phases as *Nishwas* (Inspiration) & *Uchawasa* (Expi-

ration) going on alternatively. To inhale or Entry of external air into the living body is *Nishwas*. To expel air from a living body or to expel air by releasing it in an upward direction is *Uchwasas*<sup>16</sup>. The *Prana Vayu* (atmospheric air) enters through the nasal passages, along the course of *Swasanalika* (Trachea, Bronchi) & fills up the *Kostha* (alveoli) Thereby it is allowed for a short period & is forced out through the same *Srotas*. This whole process depends mainly on *Prana Vayu* for *Nishwas* & *Udana Vayu* for *Uchawasa* from *Nasa* to the *Vayu koshas* there is interior *Shleshmika kala* (mucous membrane) is lined & which secretes a small amount of *Kapha* (thick fluid) always. This *Kapha* known as *Avalambaka Kapha* helps the part by keeping *Aadra* (moist) & also conferring *Bala* (strength). It helps to hold any foreign matter coming along with the air. *Acharya Sharangdhar* has described in *Purvakhanda* the physiological process of normal breathing as the total process of normal breathing to far transportation of organ to the tissue & the cells.

*Nabhi* generally explains the ‘umbilical or navel region. In intra-uterine life, it is through this umbilicus that the baby is attached by a chord to placenta of the mother and receives food as well as oxygen supply through maternal blood. Ayurveda assumes that umbilicus is the, one, where all vessels carry different matters, origin. *Prana* is one of these matters<sup>17</sup>. *Nabhi* is said to be the site or point of origin of *Siras* (veins or blood vessels) but in modern-day anatomy, we see that the blood vessels start and end in the heart

***Prana Pavana (Prana Vayu)*** *Prana Vayu* is one among the 5 types of *Vayus*. Its location is said to be *Murdha* or head. But it also travels in the *Ura* (chest, region of heart and lungs) and *Kanta* (throat). But the *Prana Vayu* in this verse is said to travel from *Nabhi* upwards.

### ***HritKamalantaram*** –

*Hrit* or *Hridaya* is a word used to describe Heart. *Hridaya* is said to be in the shape of ‘*Kamala mukula*’ inverted bud of the lotus. (Kamala=Lotus). This is also because the heart expands and contracts like the bud of the lotus open in the day and closes towards evening. The explanation of Sharangadhara can be

understood as – ‘The Prana pavana located in the Nabhi touches or enters the HritKamalantaram i.e., the Kamalas or the lotus present in the proximity of the heart.

**Kanthat Bahir viniryati** – The Prana Vayu after entering HritKamalantaram exits the Kanta or throat.

**Partum Vishnu Padamritam**- Here Vishnu Padamritam means the external environment.

**Peeta cha Ambara Peeyusham**- Ambar is the sky and Peeyusa is nectar or milk. Nectar or milk is capable to sustain a person. Nectar coming from the sky is the virtual meaning of ‘Ambarpeeyusa’. Hence ‘Ambarpeeyusa’ can logically be interpreted as oxygen from the environment. The Prana Vayu in the interior (Prana Vayu here means oxygen in the body) takes the form of the Prana Vayu present in the exterior (oxygen in the environment) and nourishes the body made up of 5 basic elements of nature (Pancha Mahabhutas).

**Punaraayativegataha** –

The air adorned with Ambarpiyusha or pure air rushes into the body very quickly in great force. This statement shows that the body, at all times is in grave need of Ambarapeeyusha or oxygen to run all its activities. Vegatahaor ‘with force’ indicates the quickness with which the oxygen needs to be supplied to the body.

**Preenayan Deham Akhilam, Jeevam cha Jatharanalam** –

The Ambarapeeyusha coming into the body is put into circulation along with Rasa-Rakta (a nutritive portion of food and blood) from the Hridaya and nourishes the entire Deha (body), supports life and life activities and kindles Jataranala (digestive fire). Now after understanding the terms in detail, let me put the explanation of Sharangadhara explaining ‘Mechanism of breathing’ as follows –Prana Vayu located at the umbilicus touches inside the heart. From the neck, it passes outside and gets back within no time, through the same route after assimilating ‘Vishnupadamritam’ or Ambarpiyusam’(oxygen) in itself. This Pranavayu maintains the entire body and it nourishes ‘Jatharagni’

## Exchange of gases<sup>18</sup>

### 1. Exchange of respiratory gases in lungs

#### a) Diffusion of Oxygen

**I. Diffusion of Oxygen from atmospheric air into alveoli** Partial pressure of oxygenic the atmospheric air is 159mmHg and in alveoli, it is 104mmHg. Because of the pressure gradient of 55mmHg, oxygen easily enters from atmospheric air into the alveoli.

#### II. Diffusion of Oxygen from Alveoli into Blood

Partial pressure of oxygen in the pulmonary capillary is 40mmHg and in alveoli, it is 104mmHg. The pressure gradient is 64mmHg. It facilitates the diffusion of oxygen from alveoli into the blood.

#### a. Diffusion of carbon dioxide

**I. Diffusion of Carbon dioxide from the blood into alveoli** Partial pressure of carbon dioxide in alveoli is 40mmHg whereas in the blood it is 46mmHg. A pressure gradient of 6mmHg is responsible for the diffusion of carbon dioxide from the blood into the alveoli.

#### II. Diffusion of Carbon Dioxide from Alveoli into Atmospheric Air

In atmospheric air, the partial pressure of carbon dioxide is very insignificant and is only about 0.3mmHg whereas, in the alveoli, it is 40 mmHg So, Carbon dioxide enters passes to the atmosphere from alveoli easily.

### 2. Exchange of respiratory gases at the tissue level

#### a) Diffusion of Oxygen from the blood into tissue level

Partial pressure of oxygen in the arterial end of the systemic capillary is only 95mmHg. The average oxygen tension in the tissues is 40mmHg. Thus, a pressure gradient of about 55mmHg exists between capillary blood and the tissues, so that oxygen can easily diffuse into the tissues.

#### b) Diffusion of Carbon dioxide from the tissue into the blood.

The partial pressure of carbon dioxide is high in the cells and is about 46mmHg. The partial pressure of carbon dioxide in arterial blood is 40mmHg. A pressure gradient of

6mmHg is responsible for the diffusion of carbon

dioxide from tissues to the blood.

		pO <sub>2</sub> mmHg	O <sub>2</sub> content	pCO <sub>2</sub>	CO <sub>2</sub> content
1	Inspired air	159	21 mL/dL	0.3	0.04mL/dL
2	Expired air	116	16 mL/dL	27	3.6 mL/dL
3	Alveolar air	100-104	13-14 mL/dL	40	5.3 mL/dL
4	Arterial blood	95	19 mL/dL	40	48 mL/dL
5	Venous blood	40	14 mL/dL	46	52 mL/dL

### Rate of respiration

Generally, Ayurvedic literature does not discuss the rate of respiration, but other ancient literature provides a scientific calculation on this topic. *Shatapatha Brahmana* has described the number of respirations day and night i.e., in 24 hours.

The computation of the above verse may be as like-  
Shatam= 100

Shatamshatani = 100 × 100= 10000

10000+ shatenashtau (800) =10800 (Prana)/inspiration

The same figure is also for apana (expiration)

Prana and apana in a day (ahoratra)=24 hours

10800+10800=21600

21600/24 = 900/hour

900/60 =15 times/minute

This respiration per minute can be taken on average and ideal healthy respiration<sup>19</sup>.

### VAYOH RAKTASANCARAH

Vessels and conveying channels from starting point as umbilicus flow in the entire body to push gases to reach all tissues of body<sup>20</sup>. Oxygenated blood is responsible for the strength, colour, and happiness of the body. Is circulated through blood in living being<sup>21</sup>. These two references dictate the idea of gas being pushed through vessels in the whole body.

### Transport of gases<sup>22</sup>

#### A. Oxygen transport

##### 1. Carriage of Oxygen in the blood

O<sub>2</sub> is carried in the blood in 2 forms:

a) in the dissolved form: the amount of O<sub>2</sub> is 0.3ml per 100ml of blood per 100mmHg pO<sub>2</sub>

b) in combination with haemoglobin: each haemoglobin molecule has 4 haem groups which have an iron in ferrous form. The sixth valency bond of each

Fe<sup>2+</sup> combines with 1 mole (2 atoms) of O<sub>2</sub>. Therefore, 4 moles (8 atoms) of O<sub>2</sub> combine with one mole of haemoglobin.

#### 2. Vehicles for Oxygen transport

**Vehicles for the transport of O<sub>2</sub> are:**

- plasma
- haemoglobin solution and
- blood

#### 3. Carriage of Oxygen in the body

a) in the tissues: Because of partial pressure gradient, at rest, 5ml of O<sub>2</sub> for each 100ml of blood passing through them. Coefficient of O<sub>2</sub> utilization i.e., percentage of O<sub>2</sub> utilized out of the amount which is made available to the tissues i.e., O<sub>2</sub> taken by tissues/O<sub>2</sub> content of arterial blood: 5/19=0.26 or 26%

b) in lungs: Venous blood pO<sub>2</sub> is 40mmHg and alveolar air pO<sub>2</sub> is 100mmHg. Thus because of pressure gradient, O<sub>2</sub> rapidly diffuses from alveoli through the thin pulmonary and capillary endothelium into the plasma, therefore, arterial blood finally leaves the lungs almost fully saturated with O<sub>2</sub> (97% saturated), at pO<sub>2</sub> 100mmHg with O<sub>2</sub> content of 19ml/dl, in dissolved form and 18.7ml/dL bound to haemoglobin.

#### B. Carbon dioxide transport

##### 1. Carriage of oxygen in the blood

CO<sub>2</sub> is carried in the plasma and RBCs in 3 forms:

- in dissolved form(0.3mL/dL)  
in plasma-CO<sub>2</sub>+H<sub>2</sub>O----H<sub>2</sub>CO<sub>3</sub>  
in RBCs-CO<sub>2</sub>+H<sub>2</sub>O-----H<sub>2</sub>CO<sub>3</sub>
- As carbamino compounds (0.7mL/dL)  
In plasma-CO<sub>2</sub>+PrNH<sub>2</sub>-----PrNHCOOH  
In RBCs-CO<sub>2</sub>+HbNH<sub>2</sub>-----HbNHCOOH

- c) As bicarbonates (3mL/dL)  
 In plasma- $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 + \text{NaHPO}_4 \rightleftharpoons \text{NaHCO}_3 + \text{NaH}_2\text{PO}_4$   
 In RBCs- $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 \rightleftharpoons \text{H}^+ + \text{HCO}_3^-$

## 2. Vehicles for oxygen transport

- a) Plasma  
 b) Bicarbonate solution  
 c) Blood

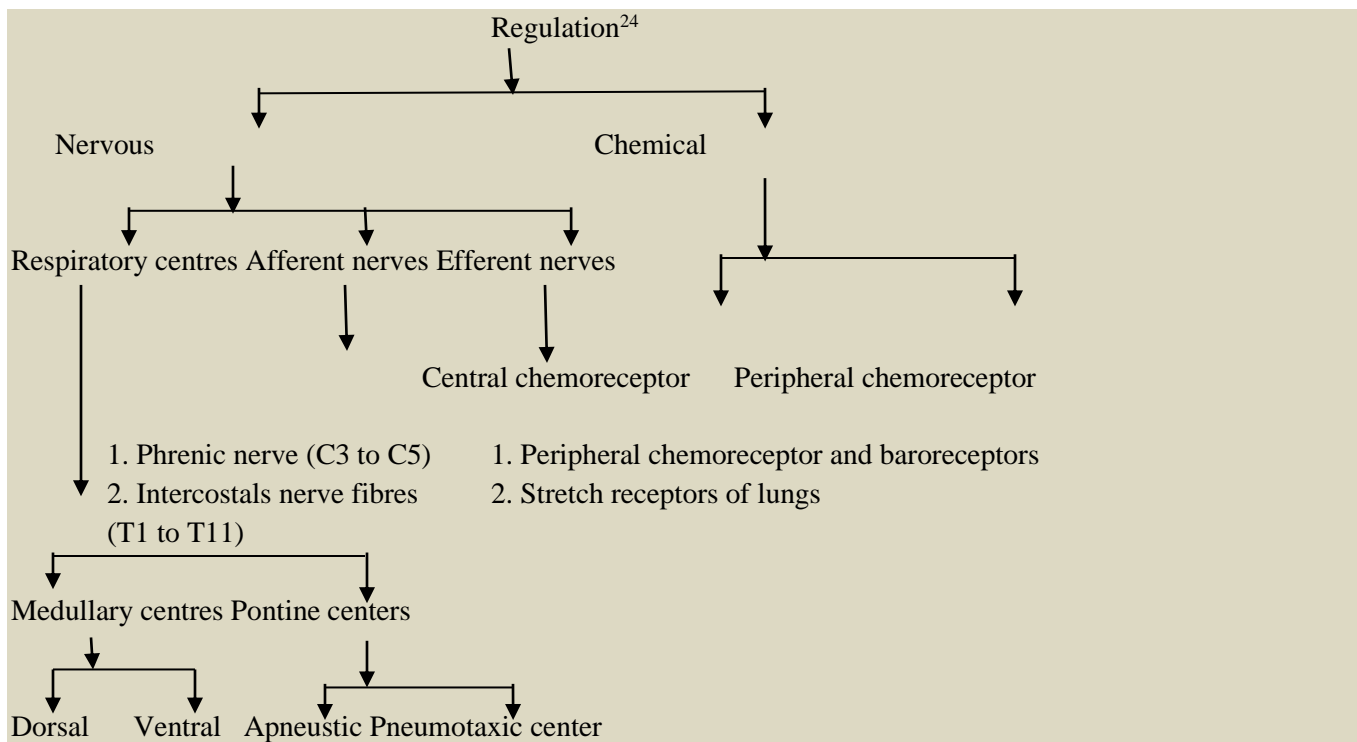
## REGULATION OF RESPIRATION

**Vata- Vatadosha** is responsible for respiratory control. In physiological conditions, **Vatadosha** fires stimulations necessary for respiration. **Vatadosha** is supported by the other two **Dosaha**. Balancing of **Sariraguna** of **Vatadosha** is managed by properties of

the remaining two. For example, **Sitaguna** of **Vata** is balanced by **Usnaguna** of **Pitta**, **Ruksaguna** of **Vata** is balanced by **Snighaguna** of **Kapha**. In this way, **Kapha** and **Pitta** maintain attributes of **Vatadosha** within physiological limits.

**Pitta-Pitta** is responsible for the control of respiration by keeping control of the production of **Vata**.

**Kapha-Kapha**, when deviated from physiological status is responsible for respiratory diseases. If vitiated, this along with the depreciated function of **Vatadosha** becomes responsible for diseases like asthma, cough. This proves that **Kaphadosha** is responsible for controlling the respiratory system<sup>23</sup>.



## CONCLUSION

Respiration is the process by which oxygen from the lungs is carried out by the blood to the tissue and carbon dioxide formed in the tissue by metabolic activity is carried by the blood to the lungs and is expired out. In *Ayurveda*, **Prana Vayu** is located in **Murdha** i.e., head, it moves in Zigzag manner i.e., moves in the chest, throat, ear, tongue, nose, supports the mind, heart, sense organs and intelligence attend to expecto-

ration, sneezing, belching, inspiration, and swallowing of food etc. This is the vital energy (**Prana**) or vital force within them. Lungs are the organs that help in this exchange of gases. The respiratory system is the channel that carries the gases along with the vital life force, known as the **Prana**. The **Chaitanya** or **Jivana** giving matter is **Prana**. The **Vahana** or transfer or conduction of this **Prana** through all structures of the body is called **Pranavahasrotas**.

The factor which gives life to the body is called *Pra-na*. Oxygen is a very important factor for the life process which is inhaled by respiration. And the *Srotas* which carry this *Prana* is called *Pranvahasrotus* and the system which supplies oxygen is called the respiratory system. The respiration process depends mainly on *Prana Vayu* for *Nishwasa & Udana Vayu* for *Uchawasa* From *Nasa* to the *Vayu koshas*. The *Prana Vayu* situated at *Nabhi Pradesha* (centre of the body) comes out of the neck, touching the lotus-like heart & after getting saturated with *Vishnu Padamrata* ( $O_2$ ) from atmospheric air again enters back forcefully. The blood absorbs the *Ambarpiyusha* ( $O_2$ ) from the air present inside & leaves off its waste  $CO_2$  which is exhaled out. The *Prana Vayu* seated at *Murdha* (brain) controls the *Swasana karma* in life. The basic control of breathing is governed by the activities of neurons of medulla & pons. The respiratory centres in the Medulla & Pons are sensitive to both excitatory & inhibitory stimuli.

## REFERENCES

1. Sarir Kriya Vidhana, Dr Nandini Dilip Dhargalkar editors Varanasi: Chaukambha Sanskrit Series Office; 4th edition 2018. P 391
2. Shareera kriya Vijnan Dr Chitta Ranjan Das editors Delhi: Chaukambha Sanskrit Pratishthan edition 2019 P-261
3. Shareera kriya Vijnan Dr Chitta Ranjan Das editors Delhi: Chaukambha Sanskrit Pratishthan edition 2019 P-261
4. Shareera kriya Vijnan Dr Chitta Ranjan Das editors Delhi: Chaukambha Sanskrit Pratishthan edition 2019 P-261
5. Sarir Kriya Vidnana, Dr Nandini Dilip Dhargalkar editors Varanasi: Chaukambha Sanskrit Series Office; 4th edition 2018. P 399
6. Sarir Kriya Vidnana, Dr Nandini Dilip Dhargalkar editors Varanasi: Chaukambha Sanskrit Series Office; 4th edition 2018. P 399
7. Agnivesha, Charak Samhita, Vidyotini, Chikitsasthana 28/5 by Pandey K, Chaturvedi G, editors, Varanasi: Chaukhambha Bharati Academy; Reprint 2009. P 775
8. Susruta, Susruta Samhita, Sharirasthana 7/5 English translation by Murthy K.R.S, editors, Varanasi: Chaukhambha Orientalia; Reprint 2008. P 149
9. Vagbhat, Ashtanga Hridaya, Sutrasthana 12/4. Sarvangasundara & Ayurveda Rasayan Commentary of Arundatta & Hemadri, by Kunte AM & Krishan Shastri Navare, editors Chaukambha Sanskrit Sansthan; Reprint 2009. P 193
10. Shareera kriya Vijnan Dr Chitta Ranjan Das editors Delhi: Chaukambha Sanskrit Pratishthan edition 2019 P-76
11. Shareera kriya Vijnan Dr Chitta Ranjan Das editors Delhi: Chaukambha Sanskrit Pratishthan edition 2019 P-28
12. Agnivesha, Charak Samhita, Vidyotini, Vimansthana 5/7 by Pandey K, Chaturvedi G, editors, Varanasi: Chaukhambha Bharati Academy; Reprint 2009. P 710
13. Sarir Kriya Vidnana, Dr Nandini Dilip Dhargalkar editors Varanasi: Chaukambha Sanskrit Series Office; 4th edition 2018. P 388
14. Sharangdhar Samhita, Purvakhandha 6/10 English translation by Murthy K.R.S, editors, Varanasi: Chaukhambha Orientalia; Reprint 2009. P 29
15. Susruta, Susruta Samhita, Sharirasthana 4/25 English translation by Murthy K.R.S, editors, Varanasi: Chaukhambha Orientalia; Reprint 2008. P 59
16. Sarir Kriya Vidnana, Dr Nandini Dilip Dhargalkar editors Varanasi: Chaukambha Sanskrit Series Office; 4th edition 2018. P 372
17. Sarir Kriya Vidnana, Dr Nandini Dilip Dhargalkar editors Varanasi: Chaukambha Sanskrit Series Office; 4th edition 2018. P 376
18. Essentials of Medical Physiology Sembulingam editors Jaypee Brothers Medical Publishers New Delhi 8<sup>th</sup> Edition 2019 P-764
19. Shareera kriya Vijnan Dr Chitta Ranjan Das editors Delhi: Chaukambha Sanskrit Pratishthan edition 2019 P-77
20. Sharangdhar Samhita, Purvakhandha 5/47 English translation by Murthy K.R.S, editors, Varanasi: Chaukhambha Orientalia; Reprint 2009. P 24
21. Agnivesha, Charak Samhita, Vidyotini, Sutrasthana 24/4 by Pandey K, Chaturvedi G, editors, Varanasi: Chaukhambha Bharati Academy; Reprint 2009. P 175
22. Textbook of Physiology Volume I Dr A.K. Jain Avichal Publishing Company Sirmour (HP) 7<sup>th</sup> edition reprint 2018P-434
23. Sarir Kriya Vidnana, Dr Nandini Dilip Dhargalkar editors Varanasi: Chaukambha Sanskrit Series Office; 4th edition 2018. P 414



24. Essentials of Medical Physiology K. Sembulingam  
editors Jaypee Brothers Medical Publishers New Delhi  
8<sup>th</sup> Edition 2019 P-77
- 

**Source of Support: Nil**

**Conflict of Interest: None Declared**

How to cite this URL: Ashish Chandrawanshi et al: A Brief Physiology Of Respiration In Ayurveda With Modern View: A Review Article. International Ayurvedic Medical Journal {online} 2022 {cited February 2022} Available from: [http://www.iamj.in/posts/images/upload/406\\_414.pdf](http://www.iamj.in/posts/images/upload/406_414.pdf)