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Review Article

CRITICAL ANALYSIS ON PHYSIOLOGY OF VOMITING REFLEX

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ABSTRACT

Background: The word *Vata* derived from the verbal root 'Va' meaning is *Gati* and *Gandhana*. *Vata* is responsible for *Gati* (movement), *Jnana* (knowledge or perception) and *Prapti* (obtaining or receiving).

Aims & Objectives: To critically analyze physiology of vomiting reflex in *Ayurvedic* terms.

Materials & Methods: The *Ayurvedic classics* were scrutinized regarding the references for derivation of *Vata Dosha*. Later, physiologico-anatomical aspects of the vomiting with reference to reflexes were studied from modern physiology books. Later, supportive correlation was done between *Ayurvedic* and modern views to build valid and reliable hypothesis regarding derivation of *Vata dosha* in relation to the various anatomical and physiological aspects of the reflexes.

Discussion & Conclusion: Physiological importance is emphasized in the word *Gamana*, *Gnyana*, *Prapti*. *Prapti* refers to physiology of receiving the impulses from the stimulus and receiving the motor response by the effector organ. *Gamana* refers to movement of impulses from sensory nerve to vomiting center and from vomiting center to effector organ even it signifies the motor response generated in intestine, sphincters, stomach, oesophagus, oral cavity. *Gnyana* refers to perceiving of the sensory impulses and generating appropriate response by the vomiting center.

Keywords: *Gamana*, *Gnyana*, *Prapti*, vomiting, physiology.

INTRODUCTION

An individual is an archetype of the universe. All the material & phenomenon of the universe are present in an individual. Similarly all those present in the individual are also enclosed in the universe¹.

The five basic elements exist in all matter. Water provides the classic example: - the solids of iced water are manifestation of the *Prithvi Mahabhuta* (earth principle). Latent heat in the ice (*Agni*) liquefies it, manifesting into *Jala Mahabhuta* (water principle). And then eventually it turns into steam expressing the *Vayu Mahabhuta* (air principle) the steam disappears into *Akasha* or space². *Bhuta* is that which is not born out of something, but out of which something is born. It is the material cause of substances in the world. When we say *Bhuta* we mean that subtle level of existence, where as *Mahabhuta* refers to gross level of existence³. *Panchikarana* is the process through which invisible *Bhutas* combine with each other and form the visible *Mahabhutas* in such a way that all *Bhutas* are present together in each *Drisya Bhuta* in varying degrees of predominance. Thus in the

physical world everything is a combination of *Pancha Mahabhutas* & we cannot see them independently⁴.

Thus the five basic elements *Akasha*, *Vayu*, *Teja*, *Jala* and *Prithvi* are present in one substance. This proves that all five elements are present in all matter in the universe⁵. Visualization of the identity of the individual with the universe paves the way for salvation. The body is described as the modified form of *Mahabhutas* hence the description of the identity of the individual & the universe relates to *Mahabhutic* composition only. The multitudes of the human features are ascribed to the proportion of different *Bhutas* each of different nature.

The balance of *Dosha* represents the healthy state and imbalance will cause various diseases. In normalcy *Doshas* will be performing their own functions and individual *Doshas* will be having their own specific sites. The word *Vata* derived from the verbal root 'Va' meaning is *Gati* and *Gandhana*. *Vata* is responsible for *Gati* (movement), *Jnana* (knowledge or perception) and *Prapti* (obtaining or receiving)⁶. Word meaning of *Vata* in derivation suggest the physiological functioning of *Vata* in the body in different dimensions.

Brief Physio- anatomical understanding of the vomiting reflex is necessary to understand physiological points emphasized in the derivation of *Vata Dosha*.

Vomiting is always preceded by nausea. Nausea is unpleasant sensation which induces the desire for vomiting. It is characterized by secretion of large amount of saliva containing more amount of mucus. Strong involuntary movements in the GI tract which start even before actual vomiting. These movements intensify the feeling of vomiting. This condition is called retching (try to vomit) and vomiting occurs few minutes after this.

Act of vomiting involves series of movements that takes place in GI tract - Beginning of antiperistalsis, which runs from ileum towards the mouth through the intestine, pushing the intestinal contents into the stomach within few minutes. Velocity of the antiperistalsis is about 2 to 3 cm/second. Deep inspiration followed by temporary cessation of breathing. Closure of glottis, Upward and forward movement of larynx and hyoid bone, Elevation of soft palate, Contraction of diaphragm and abdominal muscles with a characteristic jerk, resulting in elevation of intra-abdominal pressure. Compression of the stomach between diaphragm and abdominal wall leading to rise in intragastric Pressure. Simultaneous relaxation of lower esophageal sphincter, esophagus and upper esophageal sphincter. Forceful expulsion of gastric contents (vomit) through esophagus, pharynx and mouth. Movements during act of vomiting throw the vomitus (materials ejected during vomiting) to the exterior through mouth. Some of the movements play important roles by preventing the entry of vomitus through other routes and thereby prevent the adverse effect of the vomitus on many structures. Such movements are: Closure of glottis and cessation of breathing prevents entry of vomitus into the lungs, Elevation of soft palate prevents entry of vomitus into the nasopharynx, Larynx and hyoid bone move upward and forward and are placed in this position rigidly. This causes the dilatation of throat, which allows free exit of vomitus.

Vomiting is a reflex act. Sensory impulses for vomiting arise from the irritated or distended part of GI tract or other organs and are transmitted to the vomiting center through vagus and sympathetic afferent fibers. Vomiting center is situated bilaterally in medulla oblongata near the nucleus tractus solitarius. Motor impulses from the vomiting center are transmitted through V, VII, IX, X and XII cranial nerves to the upper part of GI tract; and through spinal nerves to diaphragm and abdominal muscles⁸.

AIMS AND OBJECTIVES

To critically analyze physiology of vomiting reflex in *Ayurvedic* terms

MATERIALS AND METHODS

The *Ayurvedic classics* were scrutinized regarding the references for derivation of *Vata Dosha*. Later, physiologico-anatomical aspects of the vomiting with reference to reflexes were studied from modern physiology books. Later, supportive correlation was done between *Ayurvedic* and modern views to build valid and reliable hypothesis regarding

derivation of *Vata dosha* in relation to the various anatomical and physiological aspects of the reflexes.

DISCUSSION

Sensory impulses for vomiting arise from the irritated or distended part of GI tract or other organs and are transmitted to the vomiting center through vagus and sympathetic afferent fibers. Vomiting center is situated bilaterally in medulla oblongata near the nucleus tractus solitarius. Motor impulses from the vomiting center are transmitted through V, VII, IX, X and XII cranial nerves to the upper part of GI tract; and through spinal nerves to diaphragm and abdominal muscles. *Vata* is responsible for *Gati* (movement), *Jnana* (knowledge or perception) and *Prapti* (obtaining or receiving).

Physiological importance emphasized in the word *Prapti* of *Vata Dosha* derivation can be understood as Receiving (*Prapti*) of the sensory stimulus by the sensory nerve endings present in the intestines. Physiological importance emphasized in the word *Gamana* of *Vata Dosha* derivation can be understood as Impulses from the nerve endings are transmitted via afferent fibers to the vomiting center, situated in medulla oblongata. The center in turn, sends motor impulses to the different parts of the gut via efferent nerve fibers. Physiological importance emphasized in the word *Gnyana* (knowledge, perception) of *Vata Dosha* derivation can be understood as Perceiving the impulses and generating the appropriate response by the vomiting center. Physiological importance emphasized with reference to motor part in the word *Gamana* of *Vata Dosha* derivation can be understood as Motor impulses from the vomiting center transmitted through V, VII, IX, X and XII cranial nerves to the upper part of GI tract; and through spinal nerves to diaphragm and abdominal muscles.

CONCLUSION

Physiological importance is emphasized in the word *Gamana*, *Gnyana*, *Prapti* mentioned in the derivation of *Vata Dosha*. *Prapti* refers to physiology of receiving the impulses from the stimulus and receiving the motor response by the effector organ. *Gamana* refers to movement of impulses from sensory nerve to defecation center and from vomiting center to effector organ. it signifies the motor response generated in gut. *Gnyana* refers to perceiving of the sensory impulses and generating appropriate response by the vomiting center.

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