



Review Article

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MAINTENANCE OF SYMPATHOVAGAL BALANCE IN DISEASES OF ANNAVAHA SROTAS THROUGH YOGIC NADIS: A REVIEW

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ABSTRACT

Nadis delineated in yoga are tube like structures for the flow of vital energy in the body. The principal nadis in yogic compendia are ida, pingala and sushumna. Pingala or suryanadi is related to right nostril and ida also named as chandranadi is related to left nostril. Both the nadis maintain the autonomic activities of nervous system in the body. The balance between them is essential for maintenance of health. Annavaaha srotas (gastro-intestinal tract) is also known as mahasrotas and its vitiation results in symptoms like aruchi (anorexia), chhardi (vomiting), aadhmana (flatulence) etc. Ida nadi can be correlated with parasympathetic dominance and pingala nadi with sympathetic dominance. Depending upon the type of pranayam i.e. chandranadi pranayam (left nostril initiated breathing) and suryanadi pranayam (right nostril initiated breathing) one of above activity can be emanated. So, to assess the role of yogic nadis for maintenance of sympathovagal balance helpful for diseases of annavaaha srotas this study was initiated. As per the disease conditions of annavaaha srotas either of pranayam would be administered as an adjunct therapy. chandranadi pranayam and suryanadi pranayam have parasympathomimetic and sympathomimetic effects respectively on annavaaha srotas.

Keywords: Annavaaha srotas, ida, nadi, pingala, sympathovagal, sushumna

INTRODUCTION

Nadis or vessels in yogic compendia are said to be 3.5 lakh in the human body which are tube like structures for the flow of vital energy in it. Among these ida, pingala and sushumna are the chief. The sushumna alone is highest and other vessels are subordinate to it in the body. They are all supported by the vertebral column and represent the sun, moon and fire. 1 Ida and pingala nadis maintain the autonomic activities of nervous system in the body. The balance between them is essential for maintenance of health. Annavaaha srotas (gastro-intestinal tract) is also known as mahasrotas and its vitiation results in symptoms like aruchi (anorexia), chhardi (vomiting), aadhmana (flatulence) etc. The standard management of these diseases is available in Ayurveda as well as in contemporary science. But there are some diseases of GIT like Amlapitta, IBS etc. which are yasya in nature and require some adjunct treatment with scientific approach. So, it is an attempt to intricate the role of yogic nadis for maintenance of sympathovagal balance in diseases of annavaaha srotas.

The texts and compendia of yoga were mainly referred for this study. Supportive texts of contemporary science, references from journals and internet were also utilized to comprehend the ancient concepts. How yogic procedures like pranayama can synergist our treatment approaches in diseases of annavaaha srotas was the prime aim for this study.

Nadi is derived from nad dhatu in sanskrit which means to flow something inside a structure.² It is a tubular organ of the body like an artery or vein and medium for flow of pranic energy, due to our defective diet and life style they become full with

impurities. So nadi-shodhana is desired before practice of pranayama.³ Ida, pingala and sushumna are foremost among all nadis and acts in collaboration with shadchakra (six plexuses) & perform essential physical, mental and autonomous functions.⁵

Sushumna is situated in between two kanda (hemisphere) like a stalk of lotus. Ida and pingala are situated on lateral aspect of sushumna out of which ida lies on left side of kanda and traced at left nostril whereas pingala is located at right nostril.⁶

Among trividha nadi, pingala is also called as suryanadi and ida is named as chandranadi.^{7,8} Usually both ida and pingala acts alternately. Ida and pingala are connected to mooladhar chakra and runs upwards surrounding sushumna to join with adnya chakra. Then these nadis get separated to establish association with left and right nostrils. Usually sushumna is stable and kundalini which appears like snake is located at mooladhar chakra. When sushumna is activated, the functions of ida and pingala are impaired. As soon as prana ascend through activated sushumna the ida and pingala becomes inactive and the respiration through both nostrils is initiated.

1) Ida Nadi: When respiration takes place entirely through left nostril it is said to be the flow of chandra in body. it helps in maintaining the cold and anabolic activity of the body. In pranayama if poorak (inspiration) is performed by chandra nadi then it always give cool effects in body even if the environment is hot.

2) Pingala Nadi: Respiration through right nostril is considered as a flow of surya. During suryabhedhi pranayama when poorak

is performed by suryanadi (right nostril), in spite of cool environment it brings heat in the body.

3) Sushumna Nadi: Respiration when equally executed through both the nostrils then sushumna nadi is operational. ida, pingala and sushumna are combined at 'bhrumadhya' and this point is recognized as triveni.⁹

From this which nadi is operational can be determined by respiration through respective nostril. Alterations in respiration from ida to pingala and from pingala to ida take place on sunrise, noontime, sunset, full moon and new moon period. When respiration from right nostril stops, and starts from left nostril this situation is entitled as uttarayan and vice versa condition is dakshinayan.

Every one practically experiences various changes in the mental states like emotions, peaceful mind, excitation, remembrance etc due to the dominance of activities in the representing hemisphere. Thus, left hemisphere shows similarity with pingala nadi while right hemisphere with ida nadi, because functions are similar in their active state. In yoga when both svara are equally flowing, balance between both hemispheres, sympathetic and parasympathetic activities is established.

Features of Nadi-shuddhi: Purification of channels of the body produces internal and external features. They are leanness of the body, enhanced luster, increased agni (digestion power) due to withholding of vayu, perception of resonance and good health.¹⁰

Physiological Changes in Nadi-shuddhi:

- 1) Pranayamic exercises bring about integration of involuntary (ANS) mechanism improves postural tone and balance with higher cortical centers which are under voluntary control. Daily 8 to 10 rounds of controlled breathing set up a cortical neural activity which becomes operational in influencing or controlling many involuntary or ANS activities.
- 2) The asanas are primarily involved with postural reflexes which are mediated by subcortical centres (medulla, pons, cerebellum, basal ganglion) that are under inhibitory control of cortical areas of brain. The greater repetition and habituation, the less would be the involvement of thalamo-cortical circuits, through ascending reticular system.
- 3) Relaxed state of skeletal muscles in some yogasanas when intra-abdominal pressure is consciously raised by 10-80 mm Hg, it is presumed to have good effect on blood circulation to viscera or remote internal areas of body.
- 4) Combinations of regular practice of yoga with oral hypoglycemic agents have better cognitive abilities in type 2 diabetic population.¹¹

Yogic nadis and shadchakra have close relationship with nervous system. Autonomic nervous system includes autonomic sensory receptor from viscera and involuntary motor to smooth, cardiac muscle & Glands. ANS has following two motor components:

- Sympathetic: Increase heart rate, support exercise or emergency action "fight-or-flight"
- Parasympathetic: Slow down HR, "rest-and-digest" activities.

Enteric nervous system is also involuntary and refers to as "brain of the gut". Around 100 million neurons are estimated in enteric plexus. Most neuron functions independently of the ANS and CNS to some extent, although they also communicate with the CNS via sympathetic and parasympathetic neurons. Bilateral activities of these neurons are:

Sensory: Chemical changes within GI tract & stretching of its wall

Motor: Contraction of GI tract smooth muscle to propel food, Secretion of GIT organ & endocrine cells.¹²

Annavaaha srotas: It is described by Sushruta in dhamani-vyakaran sharir chapter and by Charaka in srotoviman. Annavaaha srotas or mahasrotas has aamashaya, annavaahi dhamanya & vamparshva as its root source or origins. Its vitiation by any cause results in adhmaana, shoola (pain in abdomen), aruchi, chhardi, thrust, vertigo or death.¹³

The excess, irregular, improper food intake and loss of agni (digestive fire) are the prime factors for vitiation of mahasrotas. Indigestion and anorexia are major symptoms in its perversion.

Management of diseases of Annavaaha srotas: Assimilation of aam through langhana (no or reduced diet), warm water, peya, vilepi, yusha and laghu-anna probably blended by tikta-ras (bitter) drugs. As per the condition of patient niruhana (type of enema), udar-swedana (fomentation), agnivardhan (appetizer), mrudu vaman (vomiting) or virechana (purgation) can be done.¹⁴

DISCUSSION

The word nadi comes in different contexts like dhamani, vanshee, bhagandara and vessels etc in ayurvedic literature. As sira, dhamani and srotas are independently described by sushruta in sharirsthana, the nadis described in yoga-shashtra are different from these. As per present knowledge of modern anatomy, the tube like or cord like structures present in the body and appears in close relation to vessels is **nerve**. So, the nadis described in yoga may be compared with nerves in the body.

The spinal cord is not only the lower part of CNS but also a centre for reflex activities. It occupies the upper two thirds of vertebral canal and extends from the level of the upper border of the atlas to the lower border of vertebra L₁ or the upper border of L₂. If it is compared with yogic literature, then it can be said that sushumna nadi affirmed in yoga has great similarities with spinal cord because it is a greater part of central nervous system which is hidden or protected in vertebral column. If upper expanded part of CNS is considered like lotus flower, then spinal cord will appear like its stalk.

Among trividha nadi, the detail of ida and pingala nadi can be enumerated as follows:

Table 1: Comparison between Ida and Pingala nadi

Ida nadi	Pingala nadi
Also, known as chandra-nadi, ganga Lies on left side of sushumna Traced at left nostril	Named as surya-nadi, yamuna Lies on right side of sushumna Traced at right nostril
Get separated from triveni to establish association with left nostril It helps in maintaining the cold and anabolic activity of the body	Get separated from triveni to establish association with right nostril Sun factor (heat) is streamed through this nadi and maintains the body temperature.

Apart from these structural and functional aspect of ida and pingala nadi, the other literature related to these two i.e. timings of svara (nadi), methods of changing svara, work to be followed in the timings of svara etc, if studied well then, the ida svara can be correlated with parasympathetic dominance and pingala svara with sympathetic dominance which are two divisions of ANS.

The sympathomimetic effects of right nostril initiated pranayamas with sympatholytic/parasympathomimetic effect following left nostril initiated pranayamas are evidenced by Bhavanani AB et al. The main effect of UNB (uninostril

breathing) and ANB (alternate nostril breathing) techniques have differential physiological effects that are similar to the traditional svara yoga concept that air flow through right nostril (SN and pingala svara) is activatory in nature whereas the flow through left nostril (CN and ida svara) is relaxatory.¹⁵ Pal GK, et al. also confirm the effect of slow yogic breathing through right and left nostril influences sympathovagal balance.¹⁶

Since major organs of annavaha srotas are situated in abdomen and physiological outflow of ida and pingala shows similarity with ANS, it is necessary to study in brief its abdominal part.

Table 2: Abdominal part of the autonomic nervous system¹⁷

Sympathetic	Parasympathetic
1. Lumbar sympathetic trunk (somatic) Lower abdominal wall & limb Visceral branches – Pelvic organ 2. Coeliac plexus (splanchnic nerve - thorax) supply all abdominal organs & gonads	1. The vagus joins the coeliac plexus 2. The pelvic splanchnic nerves join the inferior hypogastric plexus.
Functional reflection	
Vasomotor, motor to sphincters, inhibitors to peristalsis & sensory to viscera supplied	Motor & secretomotor to the gut & glands

As per observations the vitiation of annavaha srotas by any cause results in adhmaana, shoola, aruchi, chhardi, thrust, vertigo or death. aruchi or anorexia is one of major symptom found individually and associated with other disorders. Mandagni is said to be a prime cause for perversion of annavaha srotas. aruchi and mandagni both are associated with each other and are result of decreased secretions of gut and glands. In both the cases parasympathetic activity (motor and secretomotor to the gut & glands) is reduced which will cause decreased peristalsis and secretion from glands. In this case for the management of aruchi and mandagni; chandranadi pranayam (left nostril initiated controlled breathing) can be a good accessory therapy. As this pranayam comes into force it will activate ida nadi which functionally controls parasympathetic activities of our body. The vagus nerve is the chief component for parasympathetic activity of abdominal viscera. CN pranayama will not only regularize the intestinal and glandular secretions but also will normalize the peristalsis. Thus, chandranadi pranayam can be an effective and adjunct therapy in the management of diseases of annavaha srotas where the parasympathetic activity is reduced. Bhargava R. et al. substantiated the effect of pranayama breathing exercises that, it appears to alter autonomic responses to breathe holding probably by increasing vagal tone and decreasing sympathetic discharges.¹⁸

In the diseases like chhardi or atisar (diarrhea) the peristalsis is increased than normal. Here the parasympathetic activity is increased or sympathetic activity is decreased. The suryanadi pranayam (right nostril initiated controlled breathing) in this case will increase the sympathetic activity. The abdominal sympathetic components are vasomotor, motor to sphincters and inhibitors to peristalsis. As abdominal sympathetic activity gets increased it will regulate the peristalsis and reduce the symptoms like chhardi and atisar. Thus, suryanadi pranayam can be an add-on therapy in the management of diseases of annavaha srotas where the sympathetic activity is reduced.

Taneja I. *et al.* has compared the effect of yogic and conventional treatment in diarrhea-predominant irritable bowel syndrome (IBS) in a RCT design. The experimental group was exposed to set of 12 aasanas (yogic poses) along with **surya nadi** pranayama twice a day for 2 months. Both control and

yoga intervention group showed a considerable decrease of bowel symptoms and state of anxiety. This study showed beneficial effect of yogic intervention over conventional treatment (loperamide) in diarrhea-predominant IBS.¹⁹

The role of yogasanas is demonstrated by number of researches, one study pertaining to effect of yoga and aasana practices on micronutrient absorption and physical fitness in school children has demonstrated that yoga training had improved micronutrient absorption as well as physical fitness status in adolescent school children. It is surprise to mention that micronutrient absorption has been enhanced even when no external micronutrient supplements were provided to the participants.²⁰

After a discussion on various parts of ANS and diseases of annavaha srotas, it can be said that sympathetic and parasympathetic activities are major and have involuntary control over digestive and other systems of our body. Whatever the changes in physiology of annavaha srotas occurs by any means it will affect one of these ANS activities. So, keeping in mind which type of symptoms arises one can go for its management. If sympathetic activity is diminished, then suryanadi pranayama having sympathomimetic effect can be performed or if parasympathetic activity is decreased then chandranadi pranayama can be induced to get its parasympathomimetic effect. So, yogic nadis delineated in yogic compendia has great role in maintenance and repair of body physiology.

CONCLUSION

Trividha nadis affirmed in yoga samhitas perform vital functions and can be correlated with nervous system of the body. Functionally ida nadi can be correlated with parasympathetic while pingala nadi with sympathetic activities of the body. Chandranadi pranayam has parasympathomimetic whereas suryanadi pranayam has sympathomimetic effects on annavaha srotas. Thus, yogic procedures i.e. pranayama and aasana have altering effects on autonomous nervous system and can be administered as adjunct treatment for the management of diseases of annavaha srotas. However further clinical studies with larger sample size are needed to enable a deeper understanding of the mechanism involved.

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