

# A Critical Evaluation of the Concept of “Nasa Hi Shiraso Dwaram” (Nasal Route Entry for the Cranial Cavity).

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## ABSTRACT

The development of alternative methods of drug administration has improved the ability of physicians to manage specific problems. The nasal route of administration has been used for different therapeutic and prophylactic purposes for millennia. The drugs, which are administered through the nose, act locally as well as systemically. The dose of drugs required is very minimal. The metabolism of the drug is not required through first passage and the action of the drug is faster and effective.

(Keywords: nasal drug delivery, nasya, nasal cavity, Ayurveda, traditional Indian medicine)

## INTRODUCTION

This article attempts to reveal a better scientific explanation to the concept of the administration of drugs through the nasal route as it has been well practiced by Acharyas. This route of administration was well developed in early days, and has been recognized and practiced by modern physicians since at least the past 20 years. Modern medical science has accomplished advances in the administration of drugs through the nasal route by inhalation of vaporized, nebulized, powdered, or aerosolized drug, as well as by direct instillation.

To understand the relevancy of the mode of action/mechanism of Nasya, a gross understanding of the relative anatomy of the nasal cavity is very important. The nasal cavity is bounded by floor, roof, medial and lateral walls. Important anatomical structures for consideration are mainly the floor and the roof.

- 1) Floor is formed by the horizontal process of the Palatine bone.
- 2) Roof is very narrow and formed by:
  - a) Nasal and frontal bones, anteriorly,
  - b) Cribriform plate of ethmoid bone in the middle, and,
  - c) Body of sphenoid, posteriorly.

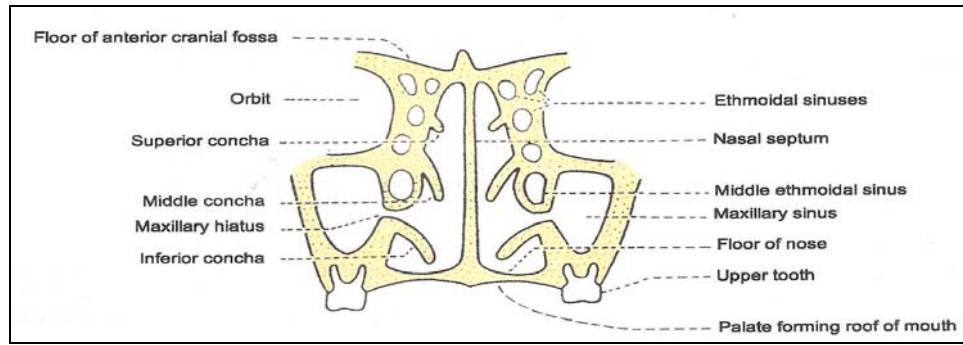
The roof of Nasal cavity is formed with the superior turbinate and cribriform plate. This is a specific plate which forms the floor of the anterior cranial fossa, having small pores in it. This is the specific area of olfaction formed by the superior turbinate constituted with special mucous membrane; which is called as olfactory membrane.

This olfactory epithelium, where olfactory receptors are located, is also called as olfactory area. The total area of olfaction on each side is about 250mm<sup>2</sup>.

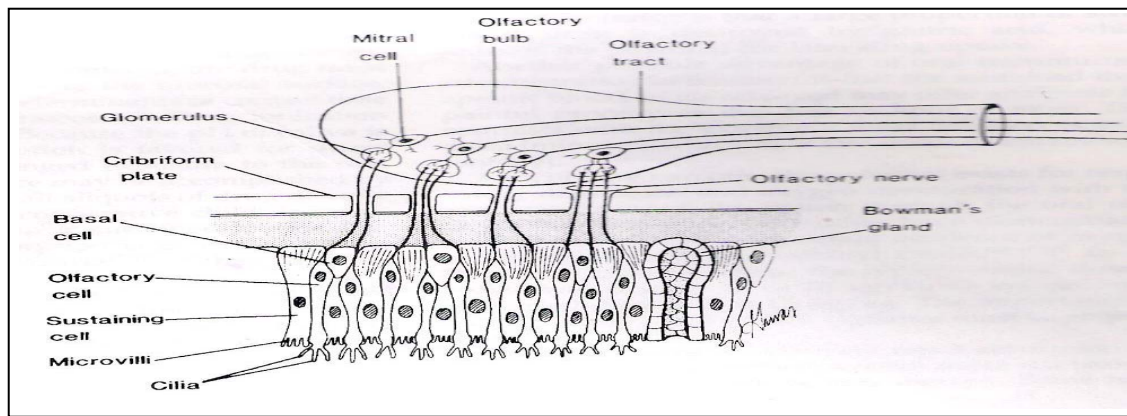
The olfactory area (epithelium) is composed of mainly the following types of cells:

- 1) Supporting (Substantacular cells)
- 2) Receptor cells and,
- 3) Basal cells

Supporting cells are columnar cells which secrete mucous. The Receptor cells are those where one end forms into Axon and the another end facing mucous layer, forms into cilia which perceive the object (i.e., smell). These axons join together to form the olfactory tract and the olfactory bulb.



**Figure 1:** Coronal Section Through the Nasal Cavity and the Maxillary Air Sinuses.



**Figure 1:** Representation of the Olfactory System.

In Ayurvedic classics, applied aspects of Nasa have been specified for than their anatomical aspect (i.e., classics have given the importance of jnanendria (cognitive sense organs)). Charaka has mentioned sense faculties for Nasa as below; (Cha. Su.8/ 6-12)

- Indria—Ghranendria (Sense faculty for smell)
- Indria Artha—Gandha (Sense objects)
- Indria Dravya—Prithvi (Material constituents of sense faculty)
- Indria buddhi—Gandha jnana (Smell Perception)
- Indria adishthana-- Nasa (Sense organ for smell)

Acharya Sushruta (Ancient Ayurvedic scholar and authoer of text Sushruta Samhita) while telling the

importance of Indriya pancha panchaka (Sensory System), Panchaabhithuta Dhamanis have been told, (i.e.; the sense faculties perceive objects which are dominated by Particular Material Constituents). This phenomenon tells about Gandha jnana (the perception of smell), when Gandha Artha (object for smell) is perceived by Nasa Indriya (nose) through Panchaabhithuta dhamanis. These dhamanis (neurons) are specific, referred to by the above scholar, which can be considered for olfactory receptors/neurons necessary for the smell. These dhamanis are porous structures, which perceive the objects (Ref; Su.Sha.9/ 10). These can be considered for the ciliary bed/the transneuronal area of the Nasal mucosa where absorption of the drug takes place.

It is stated in Ayurvedic classics that, there is a very close relationship between the Nasa and Shiras (Brain). Even modern science accepts this concept because the nasal mucosa is the only location in the body that provides a direct

connection between central nervous system (CNS) and the atmosphere. Drugs administered to the nasal cavity rapidly traverse through the Cribriform plate into the CNS by 3 routes.

- 1) Directly by olfactory neurons,
- 2) Through supporting cells and the surrounding capillary bed; and
- 3) Directly into the cerebrospinal fluid (CSF).

Acharya Charaka (Scholar) has mentioned one specific anatomical structure named Munja, which is like type of grass which acts like Ishika (i.e., like a painter's brush). This "painter's brush" when instilled in the paint, absorbs the paint; in the same way the Munja structure attracts the doshas when stimulated by the particular drug (Ref; Cha.Si. 2/ 22). The Munja structure can be thought for an olfactory bulb and the Ishika for the numerous neurons join together to form the olfactory tract. These two scholars tried to explain the functional aspects of anatomy of the nose, which simulates with the modern system.

### **PURVA KARMA (PRE-PROCEDURAL MEASURES)**

Importance of the Purva karma in Nasya karma is to facilitate for drug absorption through Nasal neurons and paranasal sinuses. In this, the repeated Paanitaapa swedana (fomentation by rubbing of palms) causes an impact on blood circulation to head. The Vasodilator action over superficial surface of the face facilitates for drug absorption. The second aspect of Purva karma; the posture giving during Nasya karma has its relevancy in two ways:

- 1) It creates the patency in channels of nasal cavity and Naso-pharynx;
- 2) The drug administered, reaches the upper part of the Nasal cavity and stimulates the olfactory neurons.

### **PRADHANA KARMA (MAIN-PROCEDURAL MEASURES)**

Where the actual drug is administered should remain for momentary retention of the drug in Nasal cavity. The provisions created by Purva

karma help in the Pradhana karma, so that the drug has a greater chance of adsorption in the air sinuses. As well as providing sufficient time for stimulating olfactory neurons.

During this explanation, classics have mentioned one more structure; the Shringataka Marma (anatomical area) where there is an association of Ghvana (nasal), Akshi (visual), Shrotra (auditory), and Jiwaha (lingual) Siras (nerves and vessels) are present (Ref; Su.Sha.6/27). Acharya Charaka says the sneha pradhana Navana Drug (lipid processed herbal drug), gets absorbed in the Shringataka region (Ref; Cha.Chi.26). The above reference by the scholar says lipid soluble drugs are much more efficiently absorbed by nasal mucosa.

Indu, the commentator for Ayurvedic epics, mentioned the exact sthana of the Shringataka Marma (i.e., Shiraso Antarmadhya Murdha) which can be considered for the Middle Cephalic Fossa. The Middle Cephalic fossa is the region, which, in connection with ethmoid and sphenoidal sinuses, consists of meningeal vessels, mainly internal carotid artery, cranial nerves (3<sup>rd</sup>, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup>). and also the optic nerve. The pituitary gland can be approached through the sphenoidal sinus by transantral and transnasal routes. The sphenoidal sinus is inferiorly in connection with the Naso-pharynx and posteriorly with the brain stem. The above show the Shringataka Marma (structure consisting of four siras in connection with four sense organs and the nerves and vessels) can be related with the Middle Cephalic fossa.

### **PASCHAT KARMA (POST-PROCEDURAL MEASURES)**

The absorption of the drug is also facilitated by the Paschat karma followed during the procedure. This starts with mardana (oil massage) over the frontal, temporal, maxillary, mastoid, and neck region. After administration of the drug, when the drug reaches the distal ends of the air ways, the patient is asked for the Nishthivana Kriya (spitting out of the medicine). The medicine should reach on the both sides of the throat; otherwise the drug adsorption doesn't occur in the siras properly (Ref; As. Sa.Su.29).

The drug used for Navana/Marsha nasya (names of different types of nasal drug administration) is processed with sneha paka vidhi till Mrudu paka

(preparation of the drug in lipid base) attains. This also has the relevancy in facilitating the stimulation as well as the absorption of the drug. To achieve rapid diffusion through nasal mucosa the lipid soluble drugs are preferred where the mucosal cilia are lipophilic in action.

In humans small particles of size 0.5 to 1.0µm tend to deposit in a naso pharyngeal part. So the particles become finer than mentioned above on undergoing Mrudu paka, which may facilitate the drug absorption at the level of the Naso pharynx.

The duration of the Nasya karma course ranges from 7-21 days. It differs for each classification of Nasya karma. These many days are needed for the action of the drug and to achieve required symptoms. Because of the quantity of the drug, very minimal and continuous stimulation to the olfactory neurons should facilitate the stimulation of the higher center (i.e., to the olfactory bulb).

Once this area is stimulated, then this stimulation is continued to the parts of Amygdala, Hypothalamus, to the parts of Basal Ganglia and to the brain stem also. This whole system is called the limbic system, which controls emotional reactions, visceral somatic, behavioral changes, motivation, biological rhythms, and respiratory, circulatory, and endocrine changes.

## CONCLUSION

All of these functions have been suggested in our classics by describing the different types of classification of Nasya karmas and these classifications can be broadly understood under two headings; 1) Shamana Nasya (Nasal administration for subsiding the toxins) and 2) Shodhana Nasya (administration for purificatory purposes). The mechanism of both Nasya types is different (i.e., the Shamana type, facilitates for drug absorption while the Shodhana type, induces stimulatory action). In the same way, the steps of the procedure of Nasya karma have been documented. On the basis of foregoing observations, one can state that the procedures, postures, and conducts explained for Nasya karma are of vital importance to the drug absorption and transportation.

So Nasya karma is used both to manage the Sthanika (local) and Sarvadaihika (general) anomalies and the relevancy of Nasa hi Shiraso

Dwaram can be proved thus (Nasal route is the direct entry to the CNS).

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## SUGGESTED CITATION

Sangeeta, H.J. and H.D. Toshikhane. 2009. "A Critical Evaluation of the Concept of "Nasa Hi Shiraso Dwaram" (Nasal Route Entry for the Cranial Cavity)". *Pacific Journal of Science and Technology*. 10(1):338-341.

