



Anatomical Peculiarities of Nose as A Route of Administration in *Nasyakarma*

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ABSTRACT

The nose is considered as one of the important routes of administration in Ayurveda. Nasya is one of the important treatment modalities and it is also one of the pancha karma procedures of Ayurveda. It is told that the nose is the opening towards the shiras so that medicines to the shiras can be best administered through the nose. It is nothing but the anatomical peculiarities which makes the nose the best route for administration of the drug in the form of Nasya karma. Moreover, it is the nearest root for the medicines to reach the head.

INTRODUCTION

Nasya is a treatment procedure in *Ayurveda* that is specially indicated in diseases above the neck. Nose being the entrance towards the head the drug administered will spread all over the head and neck and cure the diseases of this region. ¹

The nose has an external portion and an internal portion inside the skull. The external portion consists of a supporting framework of bone and hyaline cartilage covered with muscle and skin and lined by mucus membrane. The interior structures of the nose are specialized for 3 functions 1) incoming air is warmed, moistened, and filtered 2) olfactory stimuli are received, 3) Resonating chambers modify speech sounds. The space inside the nose is called the nasal cavity. It is divided into right and left sides by a vertical partition called the nasal septum. The anterior part of the nasal cavity, just inside the nostril is called the vestibule, the three shelves formed by the projection of superior, middle, and inferior nasal conchae extend out each lateral wall of the cavity. ² The four main type of cells seen in the respiratory epithelium are ciliated columnar cells, non-ciliated columnar cells, goblet cells, and basal cells. This region is considered the major site for drug absorption into the systemic circulation. ³

Olfactory receptors lie in the membrane lining the superior nasal conchae and adjacent septum. This region is called the olfactory epithelium. The axons of bipolar olfactory cells collect into about 20 fascicles which pass through the cribriform plate of the ethmoid bone. Collectively, these fascicles constitute the olfactory nerve. They serve as receptors in the olfactory pathway. They soon terminate in the olfactory bulb. The bulb is an extension of the telencephalon. ⁴

As the fiber bundles pass through the foramina, they are covered by an extension of the meninges. The dura mater becomes continuous with the periosteum of the bones of the roof the nose and the pia-arachnoid with

the perineurium of the nerve bundle. The subarachnoid space is continuous with the tissue space and therefore also related to lymphatic vessels which lie in the spaces of olfactory mucosa.⁴

Large surface area

An increase in area of contact is one of the important factors increasing drug absorption. The surface area of the nasal cavity is highly increased due to the presence of conchae and meatus which is 150 cm² in humans³.

High blood flow

The nasal mucosa is rich in blood supply. Anterosuperior quadrant is supplied by the anterior ethmoidal artery, posterior ethmoidal, and facial artery. Antero inferior quadrant is supplied by branches from facial and greater palatine arteries. The posterosuperior quadrant is supplied by the sphenopalatine artery. The posteroinferior quadrant is supplied by branches from the greater palatine artery. The anteroinferior part of the vestibule of the septum contains anastomoses between the septal ramus of the superior labial branch of the facial artery, branch of the sphenopalatine artery, and of the anterior ethmoidal artery.⁵ These form a large capillary network called Kiesselbach's plexus. Such high vascularity of nasal mucosa makes it a good route for drug administration.⁶

Porus endothelial membrane

Another anatomical peculiarity supporting the drug absorption is the porus endothelial membrane of the nasal capillaries. A study in rabbit shows that capillaries of normal respiratory and olfactory mucosa of the nasal septum are lined by fenestrated endothelia.⁷ This is an important feature of the endothelial basement membrane of nasal blood vessels.

Avoidance of first-pass metabolism

The administration of the drug through the nasal route avoids the first-pass metabolism by the liver. Most of such drugs would not reach the target organ or will reach in very less amount as they will get degraded in the digestive tract or they will be metabolized in the liver

Absorption through lymphatic vessels

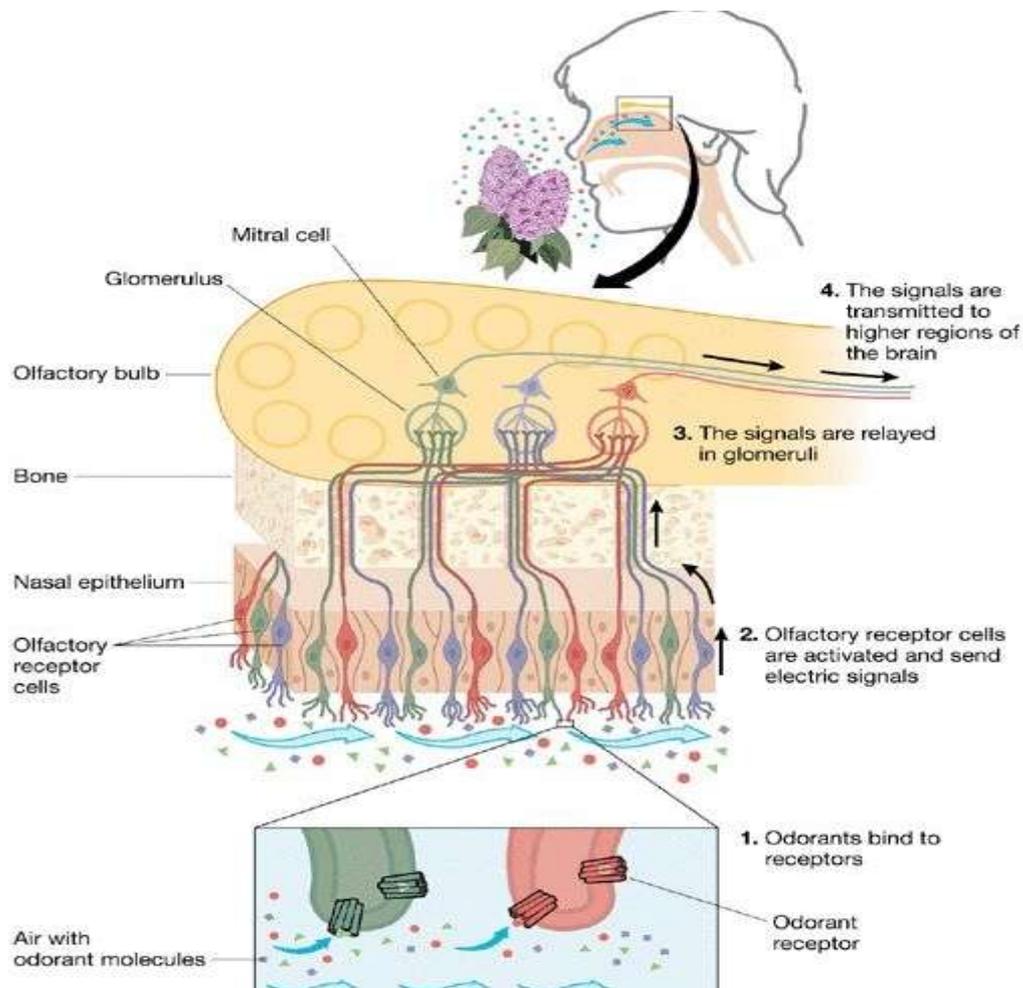
The subarachnoid space is continuous with the tissue space and therefore also related to lymphatic vessels which lie in the spaces of olfactory mucosa.⁴ The lymphatics have the property of absorbing materials from the tissues and conveying them into the circulation. Lipids and lipid-soluble compounds are best absorbed by the lymphatic system.⁸

Absorption through olfactory mucosa

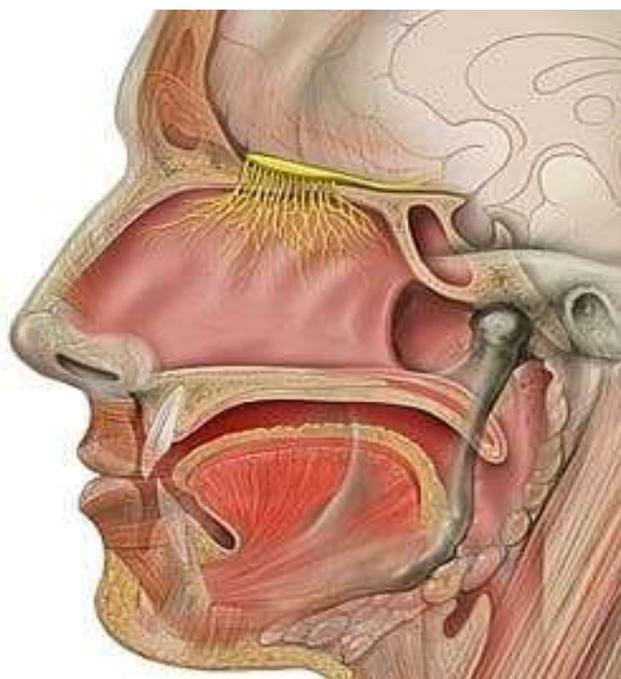
Anatomically olfactory nerves are in direct contact with both environment and central nervous system. Studies show that small molecular drugs such as cocaine and benzoylecgonine, local anesthetics like dihydroergotamine, and dopamine have been shown to reach the CNS via the olfactory pathway in animals. Hence a recent interest has been focused on the exploration of the intranasal route for drugs to the brain via olfactory mucosa. Due to the unique connection of the nose and CNS, the intranasal route can deliver therapeutic agents to the brain bypassing BBB via intranasal delivery.³

CONCLUSION

The anatomical peculiarities of the nose make it the best route for the administration of the drug to the head and neck region. These peculiarities were best utilized by Acharyas in the Nasaya procedure. This might be the reason why Nasaya karma is tremendously efficient in curing the diseases of the head and neck. The drug absorption is also fortified by local massaging and fomentation which increase the blood supply to the area and cause vasodilatation.



Olfactory receptors



Internal view of nose



Nasa hi shiraso dwaram

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