WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 15, 1126-1135. Review Article ISSN 2277–7105

REVIEW ON NASYA KARMA AND ITS PHARMACODYNAMICS - A CONCEPTUAL STUDY

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Article Received on
18 June 2024,

Revised on 08 July 2024,
Accepted on 28 July 2024

DOI: 10.20959/wjpr202415-33438

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ABSTRACT

Acharyas have noted that the nose serves as a gateway to the head. It is regarded as one of the *Panchagyanendriya*, responsible not only for olfaction and respiration but also as a route for drug delivery. Modern pharmacology delineates various methods of administering drugs, paralleled by *Ayurveda* which has proven highly beneficial over time. Among these methods, nasal administration is particularly effective for treating diseases above the clavicles. *Nasya Karma* involves the instillation of herbal oils and liquid medicines into the nostrils. This review discusses the potential mechanisms of *Nasya Karma* in both *Ayurvedic* and modern contexts, focusing on its probable actions on crucial points within the brain and its associated structures.

KEYWORDS: *Nasya Karma, Nasal Medication,* Pharmacodynamics.

INTRODUCTION

Medications administered through appropriate routes enhance drug efficacy and simplify administration procedures. Modern pharmacology and *Ayurveda* have extensively described various methods of drug administration that have proven beneficial over time. In *Ayurveda, Nasya Karma* is a specialized procedure for delivering drugs targeting the brain.[1] This involves administering herbalized oils and liquid medicines through the nostrils in a specific manner to treat local nasal and supraclavicular diseases.

Nasya Karma differs from standard nasal medication in its administration purpose, method, and the types of medicines used. Pharmacokinetic and pharmacodynamic studies indicate that intranasal drug delivery provides a promising alternative for administering drugs that affect the central nervous system (CNS). This route demonstrates superior drug absorption into the cerebrospinal fluid.[2] (CSF) compared to other routes, likely due to the avoidance of hepatic first-pass metabolism and drug degradation. Moreover, the direct nose-brain pathway through the blood-brain barrier facilitates rapid delivery of certain nasal medications to the CSF.[3,4]

Etymology of *nasya*

The term "*Nasya"* originates from the Sanskrit root *"Nasa*," which implies motion towards the internal structures, particularly the head, through the nose, its accessory structures, and the head itself. In *Ayurvedic* terminology, "*Nasa"* refers specifically to the nose (*Nasa Nasikayam).*

The nose, or "*Nasa*," is considered the sole gateway to the "*Shira*," which is regarded as the supreme and crucial part of the body where life and sensory faculties reside. The senses and the channels transmitting sensory and motor impulses from the head are compared to rays emanating from the sun within the *Shira.*[5] Alongside vital organs in the trunk, the *Shira* is among the three vital parts essential for the body's existence.[6] *Ayurvedic* texts emphasize that the nose is the exclusive route to the head, implying that any medicine administered through the nose can directly influence the head.[7]

In *Ayurveda*, the nose is classified among the "*Panchagyanendriya*," or five sensory organs, which serve roles beyond olfaction and respiration, including as a pathway for drug administration.[8] To address deeply rooted morbid *Doshas* (Biological humors), *Nasya* therapy is universally recommended by *Ayurvedic* scholars. Medicines administered through the nostrils travel through the nasal passages and reach the porous cribriform plate, where they are absorbed and reach the brain tissues, skin to local application on brain tissues.

The definition of *Nasya* involves the administration of medicine or medicated oils through the nose.[9] It is also known by synonyms such as *Shirovirechana, Shirovireka, Murdha virechana*, *Navana*, and *Nasya Karma*, which reflect its primary function of eliminating morbid *Dosha* from regions above the clavicles, as well as the beneficial effects on the nose.

Significance of *nasya karma*

The primary objective of any *Panchkarma* therapy is to eliminate *Doshas* through the most accessible route. *Nasya* is considered pivotal as it provides direct access to the head *(Shira)* via the nasal passages, which are indirectly connected to brain centers. It facilitates achieving optimal oxygen balance in the body. Medications administered nasally spread throughout the nasal cavity and reach the head, aiding in the expulsion of *Doshas* and thereby alleviating associated diseases. *Nasya* is particularly effective for treating disorders above the clavicle and serves as the primary purification therapy for upper body regions *(Urdhwanga*). Successful *Nasya* therapy eliminates *Kapha Dosha*-related toxins from the paranasal sinuses, promoting nourishment of the affected area and resulting in significant relief in the head and enhanced clarity of sensory functions.

Additionally, *Nasya Karma* offers the following advantages

- Facilitates unimpeded respiration, enhancing sleep quality.
- Enhances sense of smell.
- Applicable even for unconscious patients.
- Enables rapid absorption of medications through highly vascularized mucosal surfaces.
- Supports health maintenance as part of daily routines *(Dinacharya).*
- Bypasses the gastrointestinal tract and initial liver metabolism.
- Reduces adverse effects

Nasya therapy is particularly effective for treating chronic sinusitis, headaches, throat disorders, persistent colds, chest congestion, epilepsy, catarrh, migraines, voice issues, eye conditions, and cervical spondylitis.

Classification of *nasya*: All the *Acharyas* have classified *Nasya* in different way but sum-total of classification is that all are practically the same. Table of classification of *Nasya* according to various *Acharyas* is given in (Table 1).

Table 1: Classification of *Nasya* according to various *acharyas.*

S. N.	Name of *Acharyas*	No	Reference	Classification
1	*Acharya charak*	3 5	*Ch.Vi. 9/89-92* *Ch.Si.8/151*	According to mode of action- *Rechan, Tarpan, Shaman* According to the Method of Administration - *Navan, Avapidan,*

		7		*Dhamapan, Dhum* and *Pratimarsh* According to various parts of drugs utilized- *Phala, Patra, Mula, Kanda, Pushpa, Niryasa, Twaka*
2	*Acharya sushruta*	5	*S.Chi.40/21*	*Shirovirechana, Pradhamana, Avapida, Nasya, Pratimarsha*
3	*Acharya vagbhata*	3	*As.H.Su.20/2*	*Virechana, Brimhana, Shamana*
4	*Acharya kashyapa*	2	*Ka.Si.4/3*	*Shodhana, Poorana*
5	*Acharya sharangd hara*	2	*Sha.S.U.8/2,11,24*	*Rechana, Snehana*

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***Nasya karma* procedure:** The administration procedure of *Nasya Karma* involves three distinct stages:

A) Purva karma

1. **Preparatory stage:** This includes gathering necessary materials *(Sambhara Sangraha*) such as *Nasya* medications, oils for *Abhyanga massage,* cotton pads, gauze, lotus petals for eye protection during *Swedana* (Sweating), *Gokarna* (A specific tool), warm water for mouth rinsing *(Kavala),* and *Dhumavarti* (Smoking device).
2. **Patient selection:** Prior to treatment, the physician assesses the patient's suitability.
3. **Positioning preparation:** The patient is instructed to relieve natural urges, wash the face and mouth with lukewarm water, undergo *Abhyanga* and *Sweda* on the upper body. The patient then lies supine with arms and legs extended, legs slightly elevated, and the head tilted up to 45 degrees.

B) Pradhan karma

Following *Purva Karma*, the patient's eyes are covered with *Chatruguna Vastra* (Four-folded cloth). The medication, initially warmed, is administered by gently tilting the patient's nose upwards with the *Vama Pradeshni* tool. Using *Dakshina Hasta* (Right hand), the medicine is instilled into both nostrils sequentially, closing one nostril while administering to the other, and vice versa using *Suktika* or *Pichu, Pranadi* (Dropper). The patient is instructed to remain

relaxed throughout and after *Nasya* administration, avoiding speech, anger, sneezing, laughter, or excessive head movements.

C) Paschat karma

1. The patient remains in a supine position for a specified duration (Hundred *Matra Kalas).*
2. The patient inhales the medicine with moderate force and expels it through the mouth, alternating the head's direction without sitting up.
3. Following *Nasya Karma*, the patient undergoes *Mukhprakshalana* with lukewarm water.
4. *Acharya Sushruta* recommends additional therapies such as *Dhumpana* (Smoking), *Kavala* (Mouthwash), and *Gandusha* (Gargling) to eliminate *Kapha* from the head, throat, and nose.

Pharmacodynamics (Mode of action) of *nasya*

According to *Ayurvedic* principles, *Nasya Karma* is a *Panchkarma* procedure aimed at alleviating and completely eradicating vitiated *Doshas* and associated diseases, though a detailed mechanistic explanation is lacking in classical texts. *Acharya Charaka* describes the nose *(Nasa)* as the gateway to the head *(Shira),* through which medicines administered enter and specifically target the morbid *Doshas* responsible for the pathology. An analogy used by *Chakrapani* explains that *Nasya* removes *Doshas* akin to how Pith (*Ishika)* is extracted after clearing the fibrous coating of *Munja grass.*[10]

Acharya Sushruta identifies the *Shringataka Marma* as a *Sira Marma*, formed by blood vessels *(Siras)* supplying the nose, ears, eyes, and throat, suggesting that drugs administered via *Nasya* may enter these vessels and cleanse them.[11] He also warns of potential complications, such as excessive nasal administration leading to *Mastulunga Srava* (Cerebrospinal fluid flow through the nose).[12] highlighting a direct nasal-brain pathway relation.

Acharya Vagbhata elaborates further, stating that drugs administered through the nose reach the *Shringataka Marma* in the head, which comprises the blood vessels of the nose, eyes, ears, and throat.[13] The medication travels through this route, scraping off vitiated *Doshas* from the upper body regions *(Urdhwajatru)* and promoting normal physiological functions.

Indu, a commentator on *Ashtanga Samgraha*, posits that the *Shringataka Marma* is located internally within the middle part of the head.

Interpretation of *shringataka marma*

The *Shringataka Marma* is identified as a network of cavernous structures providing nutritional support to the nose, ears, eyes, and tongue, analogous to the cavernous sinus. This sinus receives venous blood from various cranial bones, brain tissues, and meninges, along with cerebro-spinal fluid (CSF). It communicates with extra cranial veins through emissary veins. Drainage into the facial vein occurs via the superior ophthalmic veins, which is the principal facial vein draining the ear, nose, and mouth. This anatomical arrangement underscores the concept of nutritional support (*Santarpan)* for structures of the ear, nose, and throat. Therefore, any medication administered through the nose reaches the *Shringataka Marma*, nourishing these anatomical regions via their respective blood vessels (*Siras).*

Pillai Sreekumar (Jamnagar, 2005) in his research work hypothesized the role of *Shringataka Marma* in *Nasya Karma* can be interpreted in the following ways- (Table 2). So in *Ayurvedic* point of view assimilation and transportation of *Nasya* drug take place through *Shringataka Marma* and reaches to local as well as general circulation. The mode of action can be interpret in the following way: (Table No:3)

Table 2: Facts about shringataka marma.

S. N.	Facts	Interpretation
1.	*Shringataka* is the union point of *Shrotas* of *Jihwa*, *Ghrana*, *Netra* and *Shrotra (Su.Sha. 6/27)*	Confirms the influence of *Nasya Karma* on senses
2.	*Shringataka* is a *Sadya Pranahara Marma*	Proper stimulus can cause desired effect suddenly.
3.	*Shringataka* is a *Siramarma* where *Vata, Pitta Kapha* and *Rakta Vaha Siras* are present	Through these *Nasya Dravya* is absorbed.
4.	The locus of *Aajna Chakra* and *Buddhi Vaisheshika Pitta* somewhat corresponds with *Shringataka*	Stimulus of which may influence psychological activities and higher mental functions

Table 3: Pharmacokinetics of *nasya karma.*

S. N.	Pharmacokinetics	Ayurvedic comparison
1	**Access** - of the drug into the body may be through	
	Receptor cells of olfactory mucosa	*Shringataka Marma*
	Sensory receptors of trigeminal nerve	
	Cavernous sinus	
2	**Course** - of the drug	
	Neuronal pathway (A) Olfactory (B) Trigeminal	*Prana*
	Circulatory pathway	*Marma Gata Chaturvidha Siras*

	(A) Cavernous sinus	
3	**Target** - Site where effect is produced	
	Limbic System	Psychic level of Prana
	Sensory and motor area of trigeminal	Sensory level of Prana
	Whole body through circulation	Physical level of Prana
4	**Theory** - Behind action	
	A) Excitation B) Sedation	Accessed and Regulated through *Shringataka Marma*.

Modern view

Ancient *Acharyas* have historically considered the nose *(Nasa)* as the gateway to the head *(Shira)*, implying a potential connection through blood vessels or the nervous system (such as the olfactory nerve). However, from a modern perspective, there is no direct pharmacological link between the nose and the brain. Nonetheless, the olfactory region remains unique in the body for its direct interface with the Central Nervous System. The effects of drugs administered through the nasal pathway can influence brain function, as evidenced by the following examples.

- The nasal route is utilized for administering inhalational anaesthetic drugs and specific decongestants to treat paranasal sinusitis.
- In contemporary medicine, nasal sprays containing anterior pituitary hormones have been employed extensively.
- Nasal administration of an LRH antagonist over 3-6 months demonstrated efficacy in suppressing ovulation as a contraceptive method (Berauist et al., 1979).

To comprehend the impact of *Nasya* drugs on the central nervous system, understanding the potential pathways of action of *Nasya* substances becomes crucial. By analyzing the sequential stages of *Nasya Karma* procedures, several logical considerations can be identified as follows:

A. Involving blood circulation.
B. Involving lymphatic channels, including cerebrospinal fluid (CSF).
C. Involving neuroendocrine and neurovascular stimulation.
D. Involving neuropsychological pathways

Level of blood circulation

Drugs administered through the nose undergo rapid absorption via the nasal mucous membrane, entering the systemic circulation and then specific circulatory pathways due to the nose's high vascularity. Subsequently, the absorbed drugs enter the facial vein, leading to retrograde blood flow through the inferior ophthalmic vein into the venous sinuses of the brain.

Pooling of blood from the paranasal sinuses can occur similarly. Approximately 22% dilation of cerebral capillaries, induced by facial efferent stimulation, results in a 150% increase in blood flow (Chatterjee, 1980).

Lowering the head, elevating the lower extremities, and applying warmth to the face impact blood circulation in the head and face, causing temporary hyperemia. This stimulates efferent vasodilator nerves on the face's surface, leading to arterial pressure reduction due to vasodilation. Increased cerebrospinal fluid (CSF) pressure compresses brain arteries, causing transient brain ischemia, subsequently triggering an increase in arterial pressure (Cushing reflex). This process results in additional fluid transfer into brain tissue, potentially influencing drug action.

Following drug absorption, it may proceed along neural (Olfactory and Trigeminal) and circulatory (Cavernous sinus) pathways to reach the site of action.

Level of lymphatic channels including C. S. F.

Nasya medications contain both hydrophilic and lipophilic active components. The aqueous components are absorbed through the mucous membranes (nasal and olfactory mucosa), while lipid-soluble components are assimilated through nerve endings (trigeminal and olfactory).[14] Lipid-soluble drugs are typically absorbed more quickly than water-soluble ones.[15] Substances like *Taila*, *Kshara*, and *Ghrita*, which are lipid-soluble, can easily and rapidly cross the epithelial membrane and access lymphoid tissues, facilitating swift circulation through lymphatic channels—a favorable process.

Moreover, another pathway for drug absorption directly through the nose involves the extended arachnoid sheath extending from the brain to the submucosal area of the nose.

Level of Neuroendocrinal and Neurovascular stimulation

Another potential effect during *Nasya Karma* involves the stimulation of the peripheral olfactory system. The peripheral olfactory nerves act as chemoreceptors that detect the chemical properties of particles entering the nose. These receptors transmit stimuli to the olfactory bulbs, which then relay them to higher brain centers such as the hippocampus, limbic system, and hypothalamus. These higher centers are interconnected with the anterior and posterior pituitary glands, influencing both the endocrine and nervous systems.

Adjacent nerves known as terminal nerves run alongside the olfactory nerves, connecting directly to the limbic system of the brain, including the hypothalamus. The limbic system and hypothalamus regulate endocrine secretions, with the hypothalamus playing a crucial role in integrating the functions of the endocrine and nervous systems. It has direct neural connections with the posterior pituitary and indirect connections with the anterior pituitary lobe.

Neuro-Psychological levels

Terminal nerves, in conjunction with olfactory nerves, are linked to the limbic system, including the hypothalamus, in the brain. In addition to regulating endocrine secretions, this brain region is also involved in human behavioral aspects. Cowley et al. (1975) demonstrated in their research that certain drugs administered through the nose can influence immediate psychological functions by affecting the limbic system via the olfactory nerves.

CONCLUSION

The head, referred to as Uttamanga, should remain in a healthy, disease-free state to protect Shira. Nasya Karma is highlighted as the premier therapeutic procedure for ailments affecting the upper part of the body (Urdhwajatru). Following administration into the nostrils, medication is absorbed through the highly vascular mucous membrane of the nose. Subsequently, the drug may travel along neural and circulatory pathways to reach its target site. Additionally, it can influence both the limbic system at a psychological level and general circulation, ultimately eliciting either excitatory or sedative effects.

Conflict of interest

Nil.

Financial support

Not any.

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