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A critical review on the pharmacodynamics of *Nasya Karma*

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ABSTRACT

Acharyas have mentioned -"Nasa is the doorway to Shira". It is considered as one among the *Panchagyanendriya*, whose functions are not only limited to olfaction and respiration but also considered as a pathway for drug administration. Modern pharmacology has explained various routes of drug administration so do Ayurveda, which have proved very beneficial over long years. Among different routes of drug administration, nasal route is the most efficient one in diseases related above supraclavicular region. The process of instilling drug herbalized oils and liquid medicines through nostrils is called *Nasya Karma*. Present review article shows the probable mode of action of *Nasya Karma* in both Ayurveda as well as in Modern, how it will probably act on vital points located in the brain and the structures associated with it.

Key words: *Nasya Karma*, Nasal Medication.

INTRODUCTION

Medicines administer through proper routes results in better efficacy of drug and making administration simple. Modern pharmacology has explained various routes of drug administration so do Ayurveda, which have proved very beneficial over long years. In Ayurveda, a special procedure called *Nasya Karma* has been mentioned. It is an alternative route of drug administration for most of the drugs that act on brain. It is a process where in the drug herbalized oils and liquid medicines is administered through the nostrils in a specific manner for the treatment of local nasal as

well as other supraclavicular diseases.

It is different from the ordinary nasal medication in the purpose of administration, method of administration and in the contents of medicines administered. Pharmacokinetics and pharmacodynamics of drug reflects that intranasal drug delivery offers a promising alternative route for CNS drugs administration^[1] which shows that the absorption of drug is better through nasal route than any other routes in CSF.^[2] It may be because of hepatic first-pass metabolism and degradation of drug is absent. Moreover, nose-brain pathway via passing the blood brain barrier leads to nearly immediate delivery of some nasal medications to the CSF.^[3,4]

ETYMOLOGY OF NASYA

The word *Nasya* is derived from "*Nasa*" *dhatu* which conveys meaning of '*Gati*'- Motion (*Nasa Gatau*). Here the *gati* means towards the internal structures mainly to head through Nose, accessory Structures of Nose and head proper. In Ayurvedic texts, *Nasa Dhatu* is used in sense of nose (*Nasa Nasikayam*).

Nasa - Only gateway to *Shira*: *Shira* is considered as *Uttamanga* i.e. supreme, important and major part of

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the body. It is that part of the body where the life along with sense faculties resides.^[5] In the *Shira*, the senses and the channels carrying the sensory and motor impulses from it are like the rays from the sun.^[6] As the vital organs situated in the trunk, *Shira* is considered as one of the three important vital organs i.e. since the existence of the body is dependent upon them.^[7] Ayurvedic classics explained *Nasa* as the only route to the head.^[8] So any medicine which is applying through the nose can influence the head directly.

Nasa is considered as one among the *Panchagyanendriya*, whose functions are not only limited to olfaction and respiration but also considered as a pathway for drug administration. And to uproot the deep seated morbid *Doshas* *Nasya* therapy has been recommended by almost all the Acharyas. Medicine given through nostrils travels the entire nasal passage and reaches the porous cribriform plate. From there it is absorbed and reaches the tissues of brain. It is like the local application on the tissues of brain.

Definition of Nasya: Administration of medicine (drug) or medicated oil through the nose is known as *Nasya*.^[9]

Synonyms: *Shirovirechana*, *Shirovireka*, *Murdha virechana*, *Navana*, *Nasta Karma*.

Shirovirechana, *Shirovireka*, *Murdha virechana* - Indicates its main function of elimination of morbid *Dosha* from parts above supraclavicular region.

Navana, *Nasta Karma* - Denotes the side of administration and measures beneficial to nose.

Significance of Nasya Karma

The main aim of any *Panchkarma* therapy is to remove the *Doshas* through the easiest or nearest route. *Nasya* is considered the door of the *Shira*. Because *Nasa* is indirectly connected with the brain centers in the head. Perfect balance of oxygen levels in the body can be attained with *Nasya Karma*. Medicine administered through the nose, spreads through the nose to *Shira* and help in the evacuation of *Dosha*, thereby pacifying the diseases.

Nasya is the main line of treatment for diseases above the clavicle and it is the only *Shodhana* karma for *Urdhwanga*. If the *Nasya* therapy has been carried out effectively, *Kapha Dosha* related toxins from the Para nasal sinuses are eliminated and the region is nourished. Due to this, the patient feels great relief in the head and clarity of the sense organs. Along with these, *Nasya Karma* has the following benefits:

- Breathing becomes completely unobstructed which gives sound sleep at night.
- Olfactory improvement is also felt.
- Can be used even in unconscious patients.
- Rapid drug absorption via highly vascularised mucosa.
- Promotion of health as a part of *Dinacharya*.
- Avoiding the gastro intestinal tract and first-pass metabolism.
- Lower side effects.
- *Nasya* is excellent for chronic sinusitis, headaches, throat diseases, chronic colds, chest congestion, epilepsy, catarrh, migraine, voice constraint, eye diseases 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.

SN	Name of Acharyas	No	Reference	Classification
1.	Acharya Charaka	3	Ch.Si.9/89-92 Ch.Vi.8/151	According to mode of action- Rechana, Tarpana, Shamana
		5		According to the method of administration – Navana, Avapidana, Dhmapana, Dhuma, Pratimarsha
		7		According to various parts of drugs utilized –

				Phala, Patra, Mula, Kanda, Pushpa, Nirryasa, 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 Sharangdhara	2	Sha.S.U.8/2,1,24	Rechana, Snehana

Nasya Karma Procedure: The procedure of administration of *Nasya* can be divided into 3 steps:

A) *Purva Karma*:

1. Preparatory stage includes *Sambhara Sangraha*, selection of the patient and preparation of the patient for *Nasyakarma*.
2. ***Sambhara sangraha*:** medication for *Nasya*, oil for *Abhyanga*, cotton pad, gauze, lotus petals to protect eyes during *Swedana*, *Gokarna*, warm water for *Kavala*, *Dhumavarti* etc.
3. **Selection of the patient:** Before preparing the patient for *Nasya Karma*, doctor should check whether the patient is fit or unfit for the treatment
4. **Preparation of the position:** Patient is asked to relieve him/her from natural urges. After that, wash the face and mouth with lukewarm water. He should be given *Abhyanga* and *Sweda* over *Uttamanga*. Patient should be made to lie straight in supine position extending his arms and legs, legs should be slightly raised and the head slightly extended upto 45 degree.

B) *Pradhan Karma*: After *Purva Karma*, eyes of the patient are covered with *Chatruguna Vastra* (four folded cloth). The medicine which is to be administered should be lukewarm first. Later, tip of patient's nose is drawn upward by the *Vama Pradeshni* and with *Dakshina Hasta*, the medicine is instilled into both nostrils, in one nostril first,

closing the other and vice versa by using *Suktika* or *Pichu*, *Pranadi*/dropper. Patient should remain relaxed during and after the time of administration of *Nasya* and has to avoid speech, anger, sneezing, laughing, and excessive shaking of the head.

C) *Paschat Karma*

1. The patient should lie in supine position for hundred *Matra Kalas*.
2. Patient is asked to inhale the medicine with moderate force and to spit it through his mouth turning the head to either side alternatively without rising from the cot.
3. Patient then should undergo *Mukhprakshalana* with lukewarm water after *Nasyakarma*.
4. *Acharya Sushruta* advises to perform *Dhumpana*, *Kavala*, *Gandusha* etc. for eliminating *Kapha* from *Shira* (head), throat and nose.

Pharmacodynamics (mode of action) of *Nasya*

Ayurvedic view: *Nasya Karma* is one of the *Panchkarma* procedures that not only alleviates the vitiated *Doshas*, but also causes complete eradication of the vitiated *Dosha* and the disease. A clear description regarding the mode of action of *Nasya Karma* is not available in Ayurvedic classics.

According to *Acharya Charaka*, *Nasa* is the gateway of *Shira*. The drug administered through nose enters into the *Shira* (head) and eliminates exclusively the morbid *Doshas* responsible for producing the pathology. For explaining how *Nasya Karma* removes *Doshas*, example of *Munja* and *Ishika* is given in the commentary of *Chakrapani*- i.e. through *Nasya*, morbid *Doshas* are removed just like *Pith* (*Ishika*) is taken out after removing the fibrous coating of *Munja* (a type of grass) adhered to it.^[10]

Acharya Sushruta has mentioned that *Shringataka Marma* is a *Sira Marma* formed by the union of *Siras* (blood vessels) supplying to nose, ear, eye and tongue. Thus we can say that drug administered through *Nasya* may enter the above *Sira* and purifies them.^[11] *Acharya Sushruta* has also mentioned the

complications of *Nasya Karma* as excessive eliminative errhine may cause *Mastulunga Srava* (flow of cerebrospinal fluid out to the nose)^[12] which suggest the direct relation of Nasal pathway to brain.

Acharya Vagbhata has given some more details about the mode of action as below:^[13]

Drug administered through nose - the doorway to *Shira* → Reaches the *Shringataka Marma* of Head (*Shira*), which is a *Sira Marma* and formed by the *Siras* (blood vessels) of *Nasa* (nose), *Netra* (eyes), *Shrotra* (ears) and *Kantha* (throat) → The drug spreads by the same route → Scratches the morbid *Doshas* of *Urdhwajatru* and extracts them from the *Uttamanga* → Promotes the normal physiological function.

Indu commentator of *Ashtanga Samgraha* opined that *Shringataka* is situated in the inner side of middle part of the head i.e. "*Shiraso Antar Madhyam.*"

Interpretation of *Shringataka Marma*

Shringataka Marma has been identified as network of cavernous nutrition to nose, ear, eyes and tongue. This *Marma* can be taken as cavernous sinus. Cavernous sinus receives venous blood from bones of skull, brain and meninges. CSF is poured in it. It communicates with veins outside the skull through emissary veins. Superior ophthalmic vein and sometimes central vein of retina drains into Cavernous sinus.

This sinus drains into the facial vein through superior ophthalmic veins. Facial vein is the largest vein of the face and drains ear, nose and mouth. This anatomy clarifies the term *Santarpan* (nutrition) of ear, nose and mouth. So any medicine given through nose reaches the *Shringataka Marma* and does *Tarpan* of structures of ear, eyes, nose and throat via *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 3)

Table 2: Facts about Shringataka Marma.

SN	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.

SN	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 (A) Cavernous sinus	Marma Gata Chaturvidha Siras
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	Accessed and Regulated through Shringataka Marma.
(B) Sedation	

Modern view

All ancient *Acharyas* have considered *Nasya* as the gateway of *Shira* and it does not mean that there is direct channel connecting between brain and nose, but it may be suggestive of any connection through blood vessels or through nervous system (olfactory nerve etc.) while from modern point of view- There is no direct pharmacological correlation between nose and brain. However the olfactory area is the only place in the whole human body where there is contact between the outer surface and Central Nervous System. However the effect of drug on the brain, administered through the nasal pathway can be seen in followed examples:

- The nose is used as a route of administration for inhalation of anaesthetic drugs and certain decongestants for paranasal sinusitis.
- In modern medicine system, anterior pituitary hormones, in the form of nasal spray are being used since a long time.
- Nasal administration of an LRH antagonist for 3-6 months was found to be effective in inhibiting ovulation as a contraceptive measure (Berauist et al 1979).

To understand the action of *Nasya* drug on central nervous system it is necessary to know the probable pathways of action of *Nasya Dravya*. On the basis of fractional stage of *Nasya Karma* procedures, we can draw certain rational issues that are as follow:

- At the level of Blood circulation:
- At the level of lymphatic channels including CSF
- At the level of neuroendocrinal and neurovascular stimulation
- At the level of neuropsychological levels

A. Level of Blood circulation:

Drugs administered via nose → Rapid absorption through mucous membrane of nose → Enter into the

general blood circulation and then specific circulation due to high vascularity of nose → Then, entry of the drugs absorbed into the facial vein → Through which the back flow of the blood occurs through the inferior ophthalmic vein & to the venous sinuses of the brain.

- Pooling of blood from paranasal sinuses also possible in the same manner.
- Approximately 22% of total dilatation of cerebral capillaries, caused by facial efferent stimulation causes 150% increased blood flow. (Chatterjee 1980)

Lowering of the head, elevation of lower extremities, and fomentation of face → Impact on blood circulation of the head and face i.e. momentary hyperemia → Stimulation of the efferent vasodilator nerves (on the superficial surface of the face) → Fall of arterial pressure due to vasodilatation → Increased C.S.F. pressure compress the arteries in the brain → Transient ischemia in the brain → It will subsequently raise the arterial pressure (cushing reflex) → More “Slush” created in the intracranial space → Forces more transfusion of fluid in brain tissue → Possible action of drug.

After the absorption of the drug it may follow neural (olfactory and trigeminal) and circulatory (cavernous sinus) course to reach the site of action.

B. Level of lymphatic channels including C.S.F.: *Nasya* medicine contains both water as well as lipid soluble active principles. Its aqueous part principle gets absorbed through mucous membrane (Nasal mucosa, olfactory mucosa) and fat soluble active principle can be easily assimilated through nerve endings (Trigeminal and olfactory).^[14] It is seen Fat-soluble drugs are usually absorbed more rapidly than water-soluble drugs.^[15] The lipid soluble substances can easily and rapidly be transported across the epithelial membrane e.g. *Taila*, *Kshara*, *Ghrita*, etc. These lipid soluble substances can also gain an access into the lymphoid tissue. Thus, a rapid circulation through the lymphatic channels denotes a positive phenomenon. On the other hand, the extended arachnoid sheath from the brain to the submucosal area of the nose is

the other path for the absorption of drugs directly through the nose.

C. Level of Neuroendocrinal and Neurovascular stimulation: The stimulation of the peripheral olfactory system during the course of *Nasya Karma* is another possibility. The peripheral olfactory nerves are chemoreceptor in nature. The chemical characteristic of the particle get identified by these chemoreceptors that has reached into the nose. Then it carries the stimuli to the olfactory bulbs. Further, the stimuli will be carried to the higher centres- hippocampus, limbic system, hypothalamus, etc. Higher centres are connected to Anterior and Posterior pituitary and the desired effect on endocrine and nervous system occur.

Other adjacent nerves called terminal nerves run along the olfactory nerves, these nerves are connected to limbic system of the brain including Hypothalamus. The limbic system and the hypothalamus have control over endocrine secretions and hypothalamus is responsible for integrating the functions of the endocrine and nervous system as it has direct nervous connection with the posterior part of pituitary and is indirectly connected with the anterior lobe of pituitary.

D. Neuro-psychological levels: Terminal nerves along with olfactory nerves are connected with the limbic system including hypothalamus part of brain. So, apart from its role in controlling endocrine secretions, it is also concerned with behavioural aspect of human being. Cowley et al. (1975) in their work has revealed that certain drugs administered via nose may have an impact on immediate psychological functions by acting on limbic system through olfactory nerves.

CONCLUSION

Shira is considered as *Uttamanga* and to protect it from ailments it should remain healthy and disease free. *Nasya Karma* is the best *Shodhan* therapy mentioned in diseases related to *Urdhwajatru* part of the body. After instilling the medicine into the nostrils it get absorbed by mucous membrane of nose due to high vascularity and after absorption of the drug it

may follow neural and circulatory course to reach the site of action. It can also influence the psychic level (limbic system) and general circulation and ultimately produce the action (excitation or sedation).

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