

HERBAL NEBULIZER- A NEW APPROACH OF DRUG ADMINISTRATION**Soni Gaurav¹, Manohar. J², Lahange Sandeep³**

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PG Department of *Sharir Rachana*, National Institute of Ayurveda, Jaipur, Rajasthan, India**ABSTRACT**

Ayurveda by itself can tackle the needs of health care today, though some adaptation can make it more valuable in today's world. *Ayurveda* has a three tier structure i.e. *Tatwa* (Principle), *Shastra* (Theory) and *Vyavahara* (Practice). *Vyavahara* is the development of new applications according to particular problems that manifest differently. Medicinal requirement is not always fulfilled by systemic route so there is need to change the route to administer the drug. In *Ayurveda* proper Nebulization therapy has been not explained but the process of *Dhumpana* and *Nasya* may be analogous in some extent. Here in this work we had discussed various facts and factors for establishing new route of drug administration in form of herbal nebulizer. As we all know technique of nebulizer in form of aerosol through nebulization apparatus for herbal drugs is better route for respiratory distress. Technique is tried on principle of *Dhumpana* and *Nasya* itself. Thus, this work gives the glimpse of concept of inhalation therapy described in *Ayurvedic* classics and establishment of newer concept of drug administration route i.e. through Nebulization. Yet a herculean work is needed for better and precise way of converting herbal drugs in form suitable for inhalation therapy.

Key words—Inhalation therapy, *Dhumpana*, *Nasya*

INTRODUCTION

Ayurveda is a thought process, an approach to understanding life, health and disease. Classical *Ayurveda* by itself can address the needs of health care today though some modification can be more effective and useful in today's world. *Ayurveda* has a three tier structure. *Tatwa*(Principle), *Shastra* (Theory) and *Vyavahara* (Practice). The *Tatwas* are relevant for all time periods. The *Shastra* is the new interpretation of the *Tatwas* according to the time and *Vyavahara* is the development of new applications according to particular problems that manifest in different times and places. History of medi-

cines reveals the fact that *Ayurveda* has made enormous contributions to the mankind. Medicinal requirement is not always fulfilled by systemic route so there is need to change the route to administer the drug at the site of pathology i.e. Local administration; this provide advantage like less dose needed; least systemic absorption and the highest surface area for absorption. In *Ayurveda* this route basically includes *Nasya karma*¹ (Errhine Therapy), *Dhumpana*,² *Sirodhara* etc.

This drug delivery method arrived under the name of inhalation therapy in case

of respiratory diseases and its origins date back to the name of *Dhumapana* in *Ayurveda* in which fumes of drugs are inhaled for required duration and with multiple frequency based on disease severity. In *Ayurveda* proper Nebulization therapy has been not explained but the process of *Dhumpana*, *Dhoopan* and *Nasya* may be comparable in some extent. Herbal Nebulizer may likely to act on the required line of management in *Swasha Roga*³. As this therapy contains herbal components, it may establish quite safe & without any side effects even after prolonged use by the patients.

The water soluble extract of herbal drug⁴ having above properties can be used for this purpose. The drugs will be administered through nasal route in the form of aerosol with the help of Nebulizer machine. Here in this work we are going discuss various facts and factors for establishing new way of drug administration in form of herbal nebulizer.

MATERIALS AND METHODS

S. No	Route of Administration	Time of Effect
1.	Ingestion	30-90 Minutes
2.	Intramuscular	10-20 minutes
3.	Subcutaneous	15-30 minutes
4.	Rectal	5-30 minutes
5.	Sublingual	3-5 minutes
6.	Endotracheal	2-3 minutes
7.	Inhalation	2-3 minutes
8.	Intravenous	30-60 seconds
9.	Transdermal (topical)	Variable (mins - hrs).

Site of Drug Action: The site of drug action (*Adhikarana*) and mechanism of drug action (*Dravya Prabhava & Guna Prabha-va*) are the two most fundamental and yet most complex problems in pharmacodynamics. Generalizing about the site of drug ac-

1. Literal review of Ayurvedic Classics and other relevant contemporary science literature.
2. Internet material and research papers.

DISCUSSION

Route of drug administration:

Route of drug administration is mainly divided in-

1. Oral – the most convenient and most commonly used route of administration deal with the GI tract. Oral, Buccal.
2. Parenteral - any route of administration other than the oral route don't deal with the GI tract. IV, SC, IM, Inhalation.

Selection of Route is determined by:

The physical characteristics of the drug like-

1. The speed which the drug is absorbed and or released the need to bypass hepatic metabolism.
2. To achieve high conc. at particular sites Accuracy of dosage.
3. Condition of the patient.

Route for administration -Time of effect:

[TABLE No. 1]

tion (*Dosha-Dhatu-Mala-Agni*) is easy, but the precise determination of specific site and the mechanism of action of the drug are difficult and often impossible.

A drug may act at the point of application (*Nipata*) during transportation

in the body (*Adhivasa*) by reflex effects through nerves by reaching a definite concentration in a particular tissue. Drugs that act only at the site of application are said to have local or topical action (through *Nipata by Rasa & Virya*).

Herbal drugs which are *Katu, Tikta Rasaj, Ushna Virya, Laghu-Tikshna-Ruksha Guna, Katu-madhur Vipaka Kapha-Vata Shamaka* and contain volatile oils can be use in Nebulization therapy. *Ushna Virya* increases the basal metabolic rate, oxygen consumption and accelerates the breakdown of fat at mitochondrial level. According to *Ayurveda, Ushna Virya* helps in pacifying *Kapha* and *Vata*.

There are some Drugs having Bronchodilator, Anti-asthmatic, Anti-inflammatory, Anti-allergic, Analgesic and Anti-oxidant activity which can be used in the form of herbal nebulizer for the management of *Tamak Shwasa* (Bronchial Asthma).

Nasal drug delivery Advantages: The nasal cavity is covered by a thin mucosa which is well vascular. Therefore, a drug molecule can be transferred quickly across the single epithelial cell layer directly to the systemic blood circulation without first-pass hepatic and intestinal metabolism. The effect is often reached within 5 min for smaller drug molecules. Local therapeutic effects not well absorbed into the deeper layers of the skin or mucous membrane, lower risk of side effects, Transdermal route offers steady level of drug in the system.

Inhalation deliver very small amounts of the medicine directly in the air way. The dose in this form is reduced to about 1/50th the dose delivered by tablet or injection thus the action of medicine is faster and there are no general side effects⁵.

Nebulization: Etymology: L-*nebula*, cloud; Gk, *izein-* to cause

Nebulization is the process of medication administration via inhalation. It utilizes a nebulizer which transports medications to the lungs by means of mist inhalation. It is a method of administration of drug by spraying it into the respiratory passage of the patient. The medication may be given with or without oxygen to help carry it into the lungs. Nebulizers use oxygen, compressed air or ultrasonic power to break up medical solutions and suspensions into small aerosol droplets that can be directly inhaled from the mouthpiece of the device. The definition of an aerosol is a "mixture of gas and liquid particles," and the best example of a naturally-occurring aerosol is mist, formed when small vaporized water particles mixed with hot ambient air are cooled down and condense into a fine cloud of visible airborne water droplets.

An aerosol is a mist of fine droplets. Nebulizers (sometimes spelt 'nebulizer') are used in the clinical treatment of conditions like asthma, bronchitis, COPD, cystic fibrosis and chest infections. The nebulizer is actually the container into which the liquid medication is loaded for conversion to an aerosol. The nebulizer is connected to the compressor outlet with a tube.

The aerosol mist created by this process rises from the top of the nebulizer, and is delivered to the patient either through a facemask, or a connector which fits into the mouth. The choice of facemask or mouthpiece is usually left to patient preference - although a higher dose is delivered with a mouthpiece.

Concept of Nebulization in Ayurveda:⁶

The Indians dried the tobacco and chewed them. They rolled the dry leaves, lit

them and inhaled or smoked them- calling this practice “*Sikar*”. Nasal administration of drugs was indeed one of the chief procedures under the *Panchakarma* therapy of Ayurveda. *Charaka* prescribed a number of herbal formulations as powder, past, ointment and so on for nasal application. They were used as snuff, blown into the nose through a special pipe, rubbed in the cavity as a paste or ointment.

In modern science Nebulization is the therapy mainly for the respiratory diseases like bronchial asthma, COPD etc. In *Ayurveda* Proper Nebulization therapy has been not explained but the process of *Dhumpana*, *Dhoopan* and *Nasya* are may be similar in some extent. *Dhoopana* has been followed as a tradition in various religious procedures from the period of BC era. This tradition is based on sound scientific preventive public health principle. According to *Charaka* after *Vamana Karma* if vitiated *Doshas* remain stick to *Srotas* at that time *Dhoompan* has been done for proper elimination of *Doshas*. *Charaka* explained many drugs for *Dhoompana* as; *Manashil*, *Deodaru*, *Haridra*, *Hartal*, *Jatamansi*, *Agar*, *Guggulu* etc⁷. *Manashilaadi*⁸, *Dhoompana* is widely use for other respiratory diseases like *Kasa*(Cough). *Acharya Sushruta* also explained *Laksha*, *Eaanda*⁹, *Manashil*, *Deodaru* for *Dhoompana*. In *Ayurveda* nasal route is used as route of drug administration in *Nasya Karma* for *Panchakarma* therapy. The *Nasya*¹⁰ of *Lashuna*¹¹ (*Allium Sativa*) *Swarasa* and milk mixed with *Chandana* (*Santalum Album*) has been advised in acute stage of *Tamak Shwasa*. Nebulization can be correlated with *Avapidaka Nasya*¹² in which *Swarasa* or *Kalka-rasa* is given through nasal route. *Charaka* mention so many herbal formulations like powder, paste, oint-

ment etc. for nasal application. *Pradhmana Nasya* can be correlated with aerosol of nebulizer drug.

According to *Sushruta*, *Avapidaka Nasya* and *Pradhmana Nasya* are the part of *Shirovirechan Nasya*. Whereas according to *Charaka*, *Avapidaka Nasya* having two type *Shodhan* and *Stambhan Nasya*. *Acharya* explained use of *Kashaya Skandh* drugs like *Shirisha*¹³, *Bharangi* and *Pushkaramoola*¹⁴ for *Stambhan Nasya* etc. Thus, inhalation therapy is not new for *Ayurveda*, as from very ancient time *Ayurveda* are using this route of drug administration in various diseases.

Now let's see the *Pradhmana Nasya* as described in classics. *Pradhmana*¹⁵ literally means throwing powdered drug i.e. throwing *Churna* in nostrils. For which a 6 *Angula Nalika* has to make as described in classics with which *Churna* is inhaled through nostrils. According to *Vidhay* a different method is described which states that powdered drug in *Shuktipramana* is kept in thin cloth and a *Potali* is made which is kept near nostrils from which it is inhaled. This procedure can be most nearest to the concept of nebulizer of modern era.

In the process of Nebulization it is aimed at delivering the drugs to the site of action directly into bronchioles. Therefore the action of the drug is very quick. The drugs which can be used should have capacity to restrain *Vata*, *kapha Dosh*, and for amending the *Samprapti* of *Tamak Shwasa* like *Dhatu*, *Shirisha*¹⁶, *Pushkarmool*, *Haritkyadi Yoga*, *Madhu* etc.

Inhalation: Inhalation is one of the novel routes for the administration of drug especially when it is intended for the management of respiratory disorders. However, this route is as old as *Ayurveda*. *Jivaka* was the

first in *Ayurveda* person who incorporate inhalation technique. *Acharya Charaka* (200 B.C) has also mentioned various *Vamaka Yogas*¹⁷ in which powder of drug had been inhaled. Asthma drugs are preferably inhaled, because this route minimized systemic absorption and thus, improves the ratio of the therapeutic benefit to the potential side-effects. These medications used at the minimum dose and frequency required to maintain acceptable asthma control. The respiratory tract, which includes the nasal mucosa, hypo pharynx, and large and small airway structures, provides a large mucosal surface for drug absorption. The nasal mucosa is the only location in the body that provides a direct connection between the central nervous system and the atmosphere. The term Aerosol has a specific meaning denoting a fine dispersion of liquid or solid particle in a gas where the particle size is in 5-50 μm in diameter looks as mist or smoke.

Aerosol: Aerosol therapy refers to the delivery of a drug to the body via the airways by delivering it in an aerosolized form. Whereas the aerosolized drug may be intended for systemic use utilizing the vast surface area for absorption provided by the respiratory tract, the overwhelming majority of the aerosols are meant for topical use. This form of therapy has revolutionized the management of patients with various pulmonary diseases. Physical characteristics of aerosol particles including the size (diameter), density, electrical charge, hygroscopy, shape and the velocity of the aerosol have an impact on the deposition of the aerosol.^{5,6} These characteristics are dependent on several factors, namely the drug being used, its formulation and the device or the aerosol generator.

Preparation of Nebulization Fluid: The following methods are employed for preparation of Nebulization drug-

1. Though classical Ayurvedic decoction preparation method.
2. Through Soxhlet process by hot percolation method.
3. Extraction of volatile oil through steam distillation.

Decoction Method: First of all of prepare decoction as per need or as described in classics. The extract was filtered and the remaining mixture was again mixed with 16 times of water and boiled to obtain one fourth of decoction. The procedure was repeated till the mixture was totally exhausted. The final extract was then put in water bath after complete evaporation of water obtained was 22 ml. According to *Ayurveda* principle of drug formation, 5% of alcohol i.e. 3ml of ethanol was added to final volume of drug was 22ml to which 3ml of alcohol was added and stored.

Soxhlet Process of Drug Extraction: The drug was made by continuous hot percolation process known as Soxhlet process in which small volume of hot menstrum was passed over the drug by the time, as gain and again to dissolve out the active constituents until the drug was exhausted. 100gm of crude drug in fine powdered form was taken in extraction chamber of Soxhlet and moistened with water and alcohol in the ratio of 2:1 for few hours until the drug was totally moistened. Thimble made of filter paper was then placed into the wider part of the extractor. The vapors are allowed to pass through the side tube to the condenser where they are condensed and fall on the packed drug through which it percolates and extract out the active constituents. On further heating, the menstrum vaporizes while the dissolved

active constituents remain behind in the dissolved active constituents till the drug is exhausted. Thus the same quantity of menstrum was made to percolate repeatedly, about 14 to 15 times through the drug and the active constituent were collected in the flask.

The extract carried out by this method was then dried to know the solid mass. Out of 100 gm of crude drug, 30 gm of dried solid extract was obtained. This extract was then dissolved in 2 liter of distilled water and 1 liter of absolute alcohol.

RESULTS:

Inhalation as a route for the administration of drug especially for the management of respiratory disorders is as old as *Ayurveda*. Preparation of herbal Nebulization drug can be by- a) Classical Ayurvedic decoction preparation method. b) Soxhlet process.

Technique of nebulizer in form of aerosol through Nebulization apparatus for herbal drugs is better route for respiratory distress.

CONCLUSION

This paper has been prepared with a sole aim of presenting the broad approach on routes of herbal drug administration. Here technique of nebulizer in form of aerosol through Nebulization apparatus has been discussed for herbal drugs. An effort to manage acute asthma through herbal drugs can be given in the form of aerosol through herbal drugs mainly in condition where respiratory distress leads to loss of consciousness.

It is also an approach to expand the knowledge of *Ayurveda* with the help of available modern techniques. Yet lot of work has to be done for standardization of drug, under-

standing its mode of action through pharmacological studies. Few of these scientific studies have already been done by the researchers but accuracy and effectiveness of which are yet to be interpreted. This work only gives the glimpse of concept of inhalation therapy described in *Ayurvedic* classics and newer concept of drug administration route i.e. through Nebulization. A herculean work is needed for better and precise way of converting herbal drugs in form suitable for inhalation therapy.

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