



DRUG DELIVERY SYSTEM IN AYURVEDIC TREATMENT

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ABSTRACT

Drug delivery system is an important part of success full health management. Choice for route and time of drug administration is very essential for achieving success in acute and life threatening diseases. In Ayurvedic health management, ancient Acharyas have described many routes of drug delivery like mukha (oral), nasya (nasal), vasti (rectal route) etc. as well as different time of drug administration's like pratah (morning), muhurmuahu (frequently), sagraha (with morsel) etc. Depending on the acuteness, chronicity, and severity of the diseases as well as depending on the physico-chemical nature of the drug [i.e. acidic/alkaline etc.] route and time of drug delivery is selected for its better and quick absorption. Now days, in many cases it is preferred for sustain release of drug molecules for maintaining required constant bio-availability, hence the drug delivery system needs to be managed as per the requirement. Following the ancient drug delivery system many new drug delivery systems have also been developed to provide a new altitude for the medical science. It is expected, this review article will enlighten the ancient drug delivery system for its broader and judicious use.

Key words: -vasti, Ayurveda, nasya, Sharangadhara, drug delivery

INTRODUCTION:

Drug delivery refers to formulations, approaches technologies, and systems for transporting a pharmaceutical compound in the body as needed to safely achieve its desired therapeutic effect.^[1] Simply drug delivery system is the technique in which drug molecule is made available into systemic circulation or at target sources in the body for its intended effect. In Ayurvedic practice emphasis has always been given on route of drug delivery and time of drug administration^[2]. Without proper choice for delivery route, effective medicine may become ineffective or toxic. Different drugs have different physical and chemical nature hence it is always require a suitable place from where it could be absorbed and then could show the effect on being entering into the circulation. In Ayurveda science oral route of drug delivery is preferred in most of the disease conditions along with some other routes like, nasal, skin, rectal, ear and eye and also through genitalia. In traditional treatment, *anupana* (vehicle) is also impact on the drug action and can also moderate the nature of site of drug delivery and absorption⁽³⁾. Now day's different dosage forms with suitable coatings are developed for making compatibility between drug nature, route of delivery and absorption. However suitable drug delivering mechanisms are very essential for achieving the desired drug effect.

Drug delivery in Ayurveda: -

Techniques for delivering the drugs to the target area for its intended action are as old as the evolution of disease. In Ayurveda oral route of drug delivery is used in most of the cases for achieving the systemic effect. Many other routes are also described in Ayurveda for the first time, to achieve the desired systemic effect as well as local effect like *vasti*^[4]. It is the worth of Ayurveda to develop *vasti* (drug

administration in rectal route/medicated enema) one important route of drug delivery, for so many critical and chronic systemic diseases. Medicines through nasal route for upper - clavicular diseases are also the gift of Ayurvedic treatment, as *nasya-karma*. Subcutaneous route of drug delivery (for *suchikabharana rasa*)^[5], drug delivery through eye, ear, skin and oral cavity are also other routes of drug administration's used frequently in Ayurvedic practice both for local and systemic effect.

Different routes of drug delivery in Ayurvedic treatment:

Oral route: - Oral route is the most common route of administration. It is safe, convenient, and inexpensive and does not require the services of skilled personnel. Drug is administered orally in so many diseases like *jwara* (fever), *rajayakshma* (bronchial tree diseases), *apasmara* (epileptic syndrome), *atisara* (diarrhea) etc. Different dosage forms used in oral route are *churna* (powder drugs), *vati* (tablet/pills), *asava/arista* (fermentative preparations), *ghrita* (medicated ghee), *guggulu* etc. Drug delivered in this route is absorbed in different parts of alimentary canal then reaches to desired target place through metabolism. In this route therapeutic effect is achieved slowly and generally long term medication is needed^[6]. It is used both for chronic and acute diseases. For some local diseases like stomatitis, foul smelling of mouth and in certain teeth diseases some specific types of dosage form like *kavala* (mouth gargle) and *gandusha* (mouth wash) like oral applications are advised in Ayurvedic treatment^[7].

Demerits of oral drug administration:^[6]

- Some drugs are unpalatable and cause irritation of the intestinal tract resulting in nausea, vomiting and diarrhea. e.g. all most all decoctions.

- Some drugs are destroyed by intestinal enzymes e.g. insulin.
- In case of emergency and unconscious patients this route is not suitable.
- Absorption may be slow, unpredictable and irregular because of the presence of variable amounts of food at various stages of digestion as well as acidity and alkalinity of the digestive juices have a great impact on absorption of drugs.
- Drugs interaction may occur if two drugs are given simultaneously like *virudha* drugs and *ahara*. (Drugs and dietary incompatibility).

Nasal route: - Nasal route of drug delivery is known as *Nasya karma* in Ayurveda ^[8]. In Ayurvedic treatment *nasya* (nasal route of drug delivery) is one important part of *panchakarma* therapy and the route of choice for all most all diseases occurring in head, ear and nose along with mouth (*urdhwajaturgata roga*/diseases occurring in upper part of clavicle). Mostly liquid dosage forms are used for *nasya* like, *swarasa* (herbal juices), *taila* (medicated oil) etc. However in Ayurvedic treatment different fine powders are also administered through nasal route in some acute conditions like *apasmara* (epilepsies), *sanyasa* (syncope and senseless) etc. for immediate stroking the sensory path way from nasal cavity anticipating quick motor response for recovering the senses of the patient. There are five types of nasal route of drug delivery are described in Ayurveda depending on the dosage form, nature of diseases and style of application^[9]. These are *navana* (administered of oil/juice/decoctions like materials with finger), *avapidana* (administered of drug materials by squeezing it to it's juices), *dhmapana* (*pradhamana*) [fine powder drug substances are carefully administered through nasal route], *dhuma* (nasal inhalers) and *pratimarsha/marsha* (administered of different oil preparation).

Ear route: - Ear route of drug administration is called *karnapurana*. It is used both for curative and preventive purposes. Mostly ear route of drug delivery is used for local effect like *karna shula* (aching in ear), *vadhirya* (loss of hearing) etc. Different types of oil preparations are used in ear like *depika taila*, *vilwa taila*, *shambhukadi taila* etc.

Eye (conjunctiva/sclera/whole eye):-In eye, medicines are applied to conjunctiva, sclera or in whole eye. This route of drug delivery is used for local effect. Drugs are delivered to the eye route in different mode and dosage forms ^[10] such as, *seka* (administering the liquid medicaments continuously in the form of steady stream from specified 4finger height), *aschwyetana* (administration of eye drops from 2finger height), *pindi* (tiding the paste of medicaments over eye lids), *vidalaka* (externally applying the paste of drug substances over eye lids leaving the eye lashes), *anjana* (applications of very fine powders of medicaments in conjunctival sac) etc. other than these some other methods are also frequently used to apply medicines into eye like *tarpana*, *putapaka* etc. Eye route of drug delivery is used both for curative as well as preventive purposes to make the eye and it's different parts more active and prevailing.

Through head (Sirovasti/sirodhara) ^[11]. There are four ways to apply oil to the head route viz 1.*abhyang*, 2.*parishek*, 3.*pichu*, 4.*vasti*. *Sirovasti* is a therapy which involves application of medicated oil over the head with the help of an affixed cap for a prescribed period of time. This route of drug administration has very significant role in Ayurvedic neurological and psychological treatment. It is used as a very strong and successful medication in anxiety, facial paralysis, insomnia, neurological disorders, and other psychological disorders along with different types of stress. This is the unique

route of drug delivery practiced in Ayurvedic treatment.

Rectal/anal route: - Rectal route of drug administration is called *vasti* karma (medicated enema) in Ayurvedic treatment. *Vasti karma* is very important treatment for all most all *vata* diseases (diseases related to nervous system, reflecting through lesion in skeleto-muscular system). In *vasti* karma medicated liquid materials are tried to push into large intestine through rectum which is the place of *vata*, where it supposed to act. Ayurvedic healers are considering only *vasti* karma itself is the half treatment from full course of treatment to cure the diseases^[12]. Two types of *vasti* are given in rectal route such as *niruha vasti* and *anuvasana vasti*, used for different diseases and various purposes. This route of drug delivery is used for systemic diseases like *pakshyaghata*, *sarvanga vata* etc.

Different types of *varti* are also used in anal route both for systemic and local effect. These are thread like solid dosage form inserted into the anus for desired purposes. Mostly it is used to induce purgation in chronic constipation and some other cases where rectum needs to be evacuated.

Demerits of rectal route of drug administration:

- The drugs are given rectally for systemic effect in which absorption from rectum is irregular and incomplete and may cause irritation of rectal mucosa.
- Also 50% of the drug absorbed from rectum passes through liver before entering the systemic circulation thus first-pass effect cannot be fully avoided.
- The patient may be embarrassed and Inflammation of rectum may occur due to repeated administration.
- The absorption is irregular especially when rectum is not empty.

Advantages of rectal Administration:-

- Drugs could be given by this route in vomiting, motion sickness, migraine or when the patient is unable to swallow the medication.
- This route is also suitable for drugs that are irritant to the stomach
- This route is of particular value in case of children.

Genital route: - Administration of drug through genital route is called *uttara vasti*⁽¹³⁾. It is used for different gynecological diseases in female patient and drug is administered through vagina to provide necessary treatment to uterus and other female genital parts. In male patients when medicines are administered through urethra to bladder is called *uttara vasti*. Liquid dosage forms are used for *uttara vasti*.

Dermal route: Administration of medicines through skin/dermal route is frequently used in Ayurvedic treatment. Dermal route is used both for medicinal and cosmetic purposes. *Lepa*, *pralepa*, *pradeha* are the types of dermal application of different types of semisolid preparations^[14]. Different oils are most frequently used in dermal route because of their lipo-philic nature, hence absorbed easily showing quick effect. Dermal route is used for massage therapy which is massively used in Ayurvedic treatment for body relaxing phenomenon and *vata* diseases (different diseases due to nerve impairment). Drugs are applied in the form of ointments, pastes, poultice and cream to the skin for their local action. Absorption through skin is increased by suspending the drug in an oily vehicle and rubbing the preparation into the skin. This method of administration is called inoculation⁽¹⁵⁾. Because of this nature of oil and other lipid containing substance, active principles of drugs are suspended or emulsified in oil/ghees before applied over skin in ayurvedic treatment.

Subcutaneous route: Now day's subcutaneous route of drug delivery is

hardly practiced in Ayurvedic clinics. Some references are also available for subcutaneous drug delivery like *suchikabharana rasa*, which need to be applied subcutaneously in a very small dose that comes at the tip of the needle.

Classification of route of drug delivery:

Depending on the nature and site of disease the route of drug delivery is classified. Also classification depends on the nature of the drug going to be administered.

Depending on the nature of disease: -

Route of drug delivery is chosen, depending on the nature of disease i.e. whether the disease is acute or chronic.

1. Acute diseases:-In Ayurvedic treatment for acute cases such as *sanyasa*, *murchha*, *apasmara*, *visa* etc.

nasal route of drug delivery is preferred first, to make the patient conscious. Then the regular treatment procedure is followed.

2. Chronic diseases:-There are large choices of suitable route for chronic diseases such as oral in chronic fever, nasal in chronic head ache etc.

Depending on the site of disease:

1. Systemic disease: - To cure the systemic diseases like fever, *swasha*, *pakshyaghata* and *agnimandya* etc. oral route is used to deliver the drug at target place.
2. Local disease: - In case of local diseases different local application of drugs are used in concerned route i.e.in ear disease ear oil is used in ear route, for skin disease both local skin application and oral route is used.

Table showing route of drug delivery practiced in Ayurvedic health care:

Sl. No.	Route of drug delivery	Mostly used dosage form with examples	Mostly preferred diseases	Significances
1.	Oral	All types of dosage form like, powder, tablet, syrup etc.	All most all systemic diseases.	Most commonly used route.
2.	Nasal	Oil based (sneha preparations) and powdered drugs are used.	All most all diseases occurring in head and nose.	Various nasal drops are developed and used frequently for migraine. Sinusitis etc.
3.	Eye	Very Fine powders (<i>anjana</i>), ghee preparations (<i>tarpana</i>), decoctions, juices (<i>seka</i> , <i>aschyotana</i>)	Different eye diseases.	<i>Tarpana</i> , and <i>vidalaka</i> are frequently used. <i>Anjana</i> is very common and used for cosmetics and preventive purposes.
4.	Ear	Oil preparations e.g. <i>shambhukadi taila</i>	Ear and throat diseases	Now days it is used in chronic ear diseases.
5.	Skin	Kalka (paste), <i>lepa</i> (ointment/lotion) and Oil preparations	Local skin diseases	Extensively used vata diseases.

6.	Rectum	Oil, <i>varti</i> (suppository), medicated enema	Diseases related to large intestine and also for certain systemic diseases	Frequently successfully used in Ayurvedic practice.
7.	Genitalia	Liquid dosage	Diseases related to genitalia and bladder.	Occasionally used
8.	Through head (<i>siro vasti</i>)	Liquid dosage	Head, eye and other diseases occurring in upper parts of body.	Frequently used as <i>sirodhara</i> , <i>sirovasti</i> with higher success rate in many physical as well as psychological diseases.
9.	Subcutaneous	Rare description is found in Ayurvedic treatment. Fine powder is placed subcutaneously below the skin with needle. e.g. <i>suchikabharana rasa</i>	In unconscious and critical state of a diseases having poor prognosis.	Hardly used now a days

Discussion

Drug delivery system is the key for success of in-time treatment. In Ayurvedic healing procedure route of drug delivery has been emphasized at par to the choice of drug. Proper choice for route of drug administration for a specific disease is very important to achieve the efficacy of the medicines. Some peculiar routes of drug administration are the altitude of Ayurvedic treatment such as *vasti*, *nasya*, *sirodhara*, *sirovasti*, *tarpana* etc. Medicated enema (*vasti*) is massively practiced in Ayurvedic treatment procedure for various diseases with high success rate for more than thousand years. Now a day this route of drug delivery is also adopted by contemporary medical system. In many cases, to mask different irritating/non required properties of drug substances or for better absorption rectal route is used. Also in case, where it is difficult to administer the drug in other routes rectal route is used to deliver the drug. Now a day, *Rakta-vasti* and *uttara-vasti* are practiced in selective cases where it is the only alternative. But these types of *vasti* give

very impressive therapeutic result. Nasal application (*nasya*) of drug is thousand year old drug delivery system used for head and nose diseases. Natures of dosage form have the impact on the route of delivery hence oil based drugs are frequently used over skin where it is absorbed easily. The grading of disease is also a factor to choose the route of drug delivery such as in sever acute cases parenteral route is preferred where as in chronic cases oral route is preferred.

References:

1. http://en.m.wikipedia.org/wiki/drug_delivery , visited on 18/04/2016
2. Acharya Agnivesha, Charak Samhita, Vidyotini Hindi Commentary by Pt. Kasinatha Shastri and Gorakhnath Chaturvedi, Chikitsa Sthana- 30/294, 299, Page No-880,881 Chawkhamba Bharti Academy, Varanasi, Reprint ; 2013.
3. Acharya Sharangdhara, Sharangdhara Samhita, Addhamalla commentary by Pt. Parsuram Shastri, Madhyam khanda

- 06/05; Page No-278, Chawkhamba Orientallia, Varanasi, 4th edition, 2000.
4. Acharya Sharangdhara, Sharangdhara Samhita, Addhamalla commentary by Pt. Parsuram Shastri, Uttar khanda 05/1; Page No-319, Chawkhamba Orientallia, Varanasi, 4th edition, 2000.
 5. Gobinda Das Sen, Bhaishajya Ratnavali, Vidyotini Hindi commentary by Sh. Ambikadutt Shastri; Chapter-05, Verse-642-643; Page No-93, Chawkhamba Sanskrit Samsthan, Varanasi, 13th edition, 1997.
 6. Tripathi K.D, Essentials of Medical Pharmacology, Chapter-01, page-08, Jaypee Brother Medical publishers, 5th edition Reprint, 2004.
 7. A. Acharya Sushruta, Sushruta Samhita, Ayurveda Tattwa Samdipika Hindi Commentary by Pt. Ambika Datta Shastri, Chikitsa Sthan-40/62,63,68 Page No-229-30, Chawkhamba Bharti academy, Varanasi, Reprint year 2013
 8. Acharya Sharangdhara, Sharangdhara Samhita, Addhamalla commentary by Pt. Parsuram Shastri, Uttar khanda 10/4; Page No-352, Chawkhamba Orientallia, Varanasi, 4th edition, 2000.
 9. Acharya Agnivesha, Charak Samhita, Vidyotini Hindi Commentary by Pt. Kasinatha Shastri and Gorakhnath Chaturvedi, Siddhi Sthan 09/88; Page No-1070, Chawkhamba Bharti Academy, Varanasi, Reprint 2013.
 10. Acharya Agnivesha, Charak Samhita, Vidyotini Hindi Commentary by Pt. Kasinatha Shastri and Gorakhnath Chaturvedi, Siddhi Sthan 09/89; Page No-1070, Chawkhamba Bharti Academy, Varanasi, Reprint year 2013,
 11. Acharya Sushruta, Sushruta Samhita, Ayurveda Tattwa Samdipika Hindi Commentary by Pt. Ambika datta Shastri, Uttara tantra-18/04, Page No-93, Chawkhamba Bharti Academy, Varanasi, Reprint 2013.
 12. Acharya Sushruta, Sushruta Samhita, Ayurveda Tattwa Samdipika Hindi Commentary by Pt. Ambika Datta Shastri, Uttara tantra-18/49-50, Page No-98, Chawkhamba Bharti Academy, Varanasi, Reprint 2013.
 13. Acharya Agnivesha, Charak Samhita, Vidyotini Hindi Commentary by Pt. Kasinatha Shastri and Gorakhnath Chaturvedi, Siddhi Sthan 1/39; Page No-971; Chawkhamba Bharti Academy, Varanasi, Reprint, 2013.
 14. Acharya Sushruta, Sushruta Samhita, Ayurveda Tattwa Samdipika Hindi Commentary by Pt. Ambika Datta Shastri, Chikitsa sthana-37/125-26; Chawkhamba Bharti Academy, Varanasi, Reprint 2013.
 15. Acharya Sushruta, Sushruta Samhita, Ayurveda Tattwa Samdipika Hindi Commentary by Pt. Ambika Datta Shastri, Sutra Sthan-18/06, Page No.-97; Chawkhamba Bharti Academy, Varanasi, Reprint 2013.
 16. <http://www.merriam-webster.com/dictionary/inoculation> visited on 11/05/2016

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