



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 5.2
IJAR 2017; 3(3): 403-406
www.allresearchjournal.com
Received: 27-01-2017
Accepted: 28-02-2017

Dr. Dattatraya L Shinde
Professor, Department of
Kayachikitsa, Bharati
Vidyapeeth University, College
of Ayurved and Hospital,
Katraj-Dhanakwadi, Pune,
Maharashtra, India

Routes of administration of drugs

Dr. Dattatraya L Shinde

Abstract

It is always better to administer medicines through proper routes to have better efficacy and making administration simple. Modern pharmacology has explained various routes of drug administration. There are some advantages along with disadvantages. Ayurved has explained various routes of administration of drugs which have proved very beneficial over long years. More of ayurved physicians and practitioners are not using all these pharmacological recipes and different routes of administration of drugs.

Keywords: Drug Administration, Routes, Local, Systemic, Clinical Pharmacology, Plasma half life

Introduction

It is always better to administer medicines through proper routes to have better efficacy and making administration simple. Modern pharmacology has explained various routes of drug administration. There are some advantages along with disadvantages. Ayurved has also explained various routes of administration of drugs which have proved very beneficial over long years. More of Ayurved physicians and practitioners are not using all these pharmacological recipes and different routes of administration of drugs.

Routes of Administration

Drugs can be administered by different routes

Local

Systemic routes

I) G.I. tract

A) Oral– Great advantages are- Non medical advantages

1. Simplicity of the procedure
2. Low cost of the procedure

Medical advantages

1. GI tract has a vast surface area and thus the drug gets greater opportunity for absorption
2. Compared to the IV route, admixture with the blood is slower and hence safer with risky drugs disadvantages
 1. Some drugs are irregularly absorbed or too slowly absorbed.
 2. Presence of food often alters the absorption pattern of the drug.
 3. Some people take too little water while swallowing a tablet or capsule – this may lead to sticking up of the drug in the oesophagus; now if the content of the capsule is corrosive it can produce an ulcer in the oesophagus.
4. From the small intestine drug goes via portal circulation-into the liver; at this stage some (but not all) drugs are extensively metabolized by the liver, a phenomenon, called the 1st pass effect and this may reduce the bioavailability of the drug. In addition there is also intestinal 1st pass effect where the drug is metabolized by the intestinal wall. Many drugs do not suffer from appreciable 1st pass effect.
5. Many drugs are destroyed by the gastric acidity.
6. Tetracycline among the antibiotics are particularly susceptible to the presence of food in the stomach. Presence of food in the stomach, as well as Ca⁺ or iron, retard tetracycline absorption.
7. Diarrhoea can cause a hurried exit of the drug and there is some chance that the drug

Correspondence

Dr. Dattatraya L Shinde
Professor, Department of
Kayachikitsa, Bharati
Vidyapeeth University, College
of Ayurved and Hospital,
Katraj-Dhanakwadi, Pune,
Maharashtra, India

fails to be absorbed satisfactorily.

8. Question of disintegration time and dissociation time

B) Buccal/Sublingual

Some drugs (e.g. glycerol trinitrate) is so extensively metabolized by the liver (1st pass effect) that the drug is almost eliminated before it reaches systemic circulation. uch drugs are best given sublingually ; the drug is absorbed → reaches straightway to the systemic circulation without passing via the liver.

Vascularity of the buccal mucosa is a great helping factor for quick absorption of the drug.

C) Rectal

In the past, drug administered by rectal route was not uncommon. However, it has now become rare. If the drug is absorbed from lower rectum, the dug straight away by passes liver and thus the hepatic 1st pass effect is avoided. Rectal infusions are psychologically embarrassing some rectal infusions can occasionally cause rectal inflammation. To relieve constipation, rectal enema or barium enema for diagnostic purposes are popular.

II) Parenteral routes

Officialy speking parenteral routes where the drug is given by routes other than oral ingestion.

Varieties:

Injections

- 1) Intravenous
- 2) Intramuscular
- 3) Subcutaneous

III) Inhalations

- 1) Inhaled procedure for volatile anesthetics
- 2) β₂ stimulants (e.g. salbutamol inhalation) for bronchial asthma
- 3) Powder Inhalation

Ayurved

Systemic

I) G.I. tract

A) Oral Ingestion

1) Swarasa

The juice extracted from a fresh green drug by pounding it and squeezing through cloth, is called swarasa. E.g Amruta Swarasa, Vasakadi Swarasa etc.

Putpaka – Juices taken out by Putpaka Vidhi, is also considered as Swarasa. e.g. KutajPutpak, Vasaputpak

2) Kwath

One pala of coarsely powdered drug is boiled with 16 parts of water in an earthen pot, over a mild fire till the liquid is reduced to 1/8th of the original quantity this liquid is known as Qwath E.g. Punarnavadi Qwath, Guduchyadi Qwath.

Pramthya

One pala of drug is boiled in eight parts of water and reduced to quarter is called Pramathya.

Yavagu

Four palas of drug boiled in sixty four palas of water and reduced to half. In this decoction broken grains are added and thick gruel prepare. This is called Yavagu.

Yusha

One pala of the drug with powders of Shunthi and Pippali each half Karsha boiled in one Prastha of water becomes a Yusha.

Paniya jala

One pala of drug boiled in sixty four Palas of water and reduced to half the quantity is called Paniya Jalas and used as drink.

Ushnodak

Reduction of water after boiling to 1/8,1/4,or ½ its original quantity is called Usnodaka and taken at bed time relieves, Kapha, Vata, Ama, Medas, and acts as Bastishodhan and Dipana cures Kasa, Shwasa, and Jwara.

Kshirpaka

One part of drug, eight parts of cow's milk, thirty two parts of water boiled together and reduced to the quantity equivalent of milk is known as Kshira Paka e.g. Panchamulapaya. Kshira

3) Phanta

One Pala of powdered drug and one Kudava of hot water are kept in a mudpot, and filtered through cloth after sometime. This liquid is known as Churna-Drava or Phanta E.g. Brahanmadhuk Phanta, Amradi Phanta

Mantha

Mantha is also a kind of Phanta. One Pala of powdered drug is put in four palas of cold water and churned well in apot for some time to a thick consistence. This liquid is known as Mantha. e.g. Kharjuradi Mantha, Masuradi Mantha

4) Hima

One Pala of powered drug is put into eight Palas of cold water and kept one night in a pot. It is filtered through cloth next morning and used in the same dosage as that of Phanta. This is known as hima. e.g. Amradi Hima, Guduchi Hima

5) Kalka

A green drug or a dry drug converted into a paste by rubbing it on a stone with a little quantity of water added is called Kalka. E.g. Rason Kalka.

6) Churna

Nicely powdered dry drugs filtered through cloth is called Churna. e.g. Aamalakyadi Churna, Triphala Churnam,

7) Gutika

It is either prepared by cooking the powder of drugs with jiggery, sugar or Guggulu or without cooking, by macerating the powder with any liquid, honey and Guggulu and rolling into pills. e.g. Chandraprabha Guggulu, Triphala Modak

8) Avaleha

The solid mass obtained by boiling a Quath is called Avalehae. g Kantakaryavaha Leha, Chyavanaprasha

9) Sneha (Ghrita or Taila)

Medicated Sneha is prepared by mixing one part of Kalka, four of ghee or oil and four parts of any decoction. e.g. Mahatikta Ghutam, Narayan Tailam.

10) Sandhana Kashayas

Water in which, drugs kept for long periods, getting fermented are known as Asavas and Aristhas. e.g. Ushirasav, Dashamularishta

Sidhu

Juice of sweet substances fermented without boiling them is known as Sitarasa Sidhu and if prepared by boiling them, called as Pakwarasa Sidhu.

Sura, Prasanna, Kadambari, Jagala, Medaka

The fermented liquor prepared by using cooked rice, barley etc. is Sura. The clear supernatant fluid of Sura is called Prasanna, slightly thicker than it is Kadambari; next thicker to it is Jagala; still thicker is Medaka. The residue left over after distillation is called Bakkasa, Surabija or Kinwa.

Varuni, Sukta

The liquor prepared with juice of Tala, kharjura is called Varuni, that prepared with roots, tubers, fruits and added with Sneha and salts is called as Sukta.

Chukra

The liquor or syrup which gets spoiled and loses its sweetness but becomes sour is known as Chukra. Water in which jaggery is dissolved, mixed with oik, bits of tubers, roots, and fruits and fermented to acquire sour taste is called Guda Sukta

Kanjika, Sandaki

Liquor prepared with Manda of half boiled Kulmasha, Dhanya is Kanjika; that prepared with Mulaka, Sarsapa, etc, being added to it becomes Sandaki.

11) Dhatu, Rasushadhi

Swarna, Tara, Ara, Tamra, Naga, Vanga, Tikshna are the seven Dhatus which are used after Shodhan and Maran in the medicine.

Shilajatu

Shilajatu that exude out of stone by the heat of Grishma Ritu.

Kshar

Dried wood of trees which exude milky sap are burnt to ashes in fire. The ash thus obtained is dissolved in four times in a mud pot and kept overnight. Next morning the clear supernatant water is decanted out into a clean vessel and boiled till all the water evaporates, leaving of a fine white powder at the bottom. This is known as Kshara. Parada, Gadhaka. Parada conquers all diseases and confers strength.

12) Sneha

Ghruta, Taila, vasa and Majja are the four Sneha dravyas. They should be given just after sunrise.

13) Vaman

Vaman and Virechan therapies should be done during Sharad, Vasant and Pravrut Rutus. Vamana should be administered to persons who are strong, suffering from too much accumulation of Kapha, having Hrullas, who having strong will and can tolerate.

14) Virechan

Virechan is indicated in diseases arising from increased Pitta, and Ama, in diseases like Udara, Adhmana and in others also for clearing the Kostha. e.g. Trivruta Churnam, Erand Tailam.

B) Buccal/Sublingual

Gandusha, Kavala, Pratisaran

Gandusha is holding any liquid in the mouth to its full capacity without any movement inside, whereas Kavala is that which allows movement of the liquid. Gandusha is usually done with liquids and Kavala with Kalka. e.g. Honey, Ghee, Kanji, Pratisaran Churnam

C) Rectal

1) Basti Enema Therapy – Niruha –Decoction; Anuvasan-Oil Basti are of two kinds viz–Anuvasana and Niruha Basti is so called because it is administered with a Basti being used as an enema pot. Anuvasan is the one which contains only Sneha, whereas Niruha has decoction of drugs, milk and oil together.

e.g. Anuvasanarth Guduchyadi Tailam, Niruhartha Erandamuladi kwath.

II) Uttar Basti

Uttar basti is given in urethral and vaginal passage which is beneficial in shukra and artava disorders.

Phalavarti

A wick like stick of the size of a thumb, smeared over with ghee and introduced into the rectum in order to remove the accumulated Mala is called Phala Varti.

III) Inhalations

1) Nasya

Administration of medicines through the nose is called Nasya.

2) Dhumapan

Dhuma (inhalation) is six kinds; viz Shamana, Brmhana, Rechana, Kasaghna, Vamana and Vranadhupan.

Local

A) Lepa-Murdha Taila, Karnapuran

Alepana (topical) also known as Lepa is three kinds, viz, Doshghna, Vishaghna and Varnya Mukhalepa. E.g. Doshghna Lepa, Dahe Lepa.

Murdhatailam- Abhyanga, Parisheka, Pichu and Basti are four kinds of Murdha taila each one successively stronger.

Shirobasti- A piece of soft leather of twelve inches in height is tied round the head and crevices are cemented with a paste of flour of black gram so as to prevent leakage of oil. Medicated oil slightly warmed and poured into this cap and patient is asked to sit straight. By this procedure, intractable Vata Diseases, Sirakampa etc. will be cured.

Karnapuran- The region around the ear is slightly fomented and ears filled with warm oils, juices of plants or urine of animals while the patient retains this medication for a duration of 100 or 500 Matras. A Matra is the time required to move the fist around one's knee quickly. e.g. Apamargkshar taila

B) Netra Prasadana Karma

Seka, Aschotan, Pindi, Bidala, Tarpana, Putpaka and Anjana-are the theories for treatment of eye diseases.

Seka is pouring the streams of liquid over the closed eye from a height of about four Angulis. e.g. Goats milk boiled with leaves, roots and bark of Eranda, filtered and used luke warm as a Seka cures Vataja Abhisyanda

Ashyotan is to be done in day time only but not at nights, with the eye open, with drops of medicine being in stilled from a height of about two angulis. Ashyotan is to be retained for a period of 100matrae.g.Aschyotana with Triphala Kwath cures all varieties of Abhisyasnda.

Pindi also known as Kavalika is a poultice over the eye useful in Abhisyanda and Vranas of the eye. Pittabhisyanda-a Pindi of Dhatri or fruits of Mahanimba.

Bidalaka is defined as application of a paste over the eye lids; avoiding the area of eye lashes.eg. Paste prepared with Yasti, Gairika, Saindhava, Darvi and Tarkshya

Tarpana-is the method to tone up the eye. It is useful in conditions like dryness, emaciation dissimilarity, dirtiness, falling of lashesh, appearance of redness, difficulty in opening and closing of lids, Timira, Arjuna, Sukravrana, Abhishyanda, Adhimantha, Shukashipaka, Shotha and Vata –Viparyaya.

The duration of time of tarpana is 100,500,600,700 800 and 1000 syllables respectively in diseases of Vartma, Sandhi. Shukla, Krushna, Drushti and in Adhimantha and disorders of Vata. Tarpana can be done daily, alternate days or every fifth day as required.

Putpaka-Two bilwa Pramana of flesh one bilwa of other drugs; one Kudava of any liquid are all made into a paste, covered with leaves and packed in mud. When slightly dry, it is put into fire and later removed, mud coat peeled off and juice extracted from the bolus inside. This juice is put into the eyes in the same way as of Tarpana therapy. Snehana, Lekhana and Ropana are the three kinds of Putpaka

Anjana –is applied to the eyes when the Doshas have become PAKwa; in the afternoons during Hemanta and Shishir Rutus; during morning in Grishma and evening in Sharad; when there is neither too cold nor too much of heat during Varsha and any time during Vasanta.

Anjana is of three types, Lekhana, Ropana and Snehana. Anjana. e.g. Chandrodaya Varti, Karanj Varti

C) Shonitsrav

Blood-letting should be resorted to after diagnosis of the disease, the quantity may be a Prastha, half a Prastha or quarter Prastha.

Blood-letting as a method of treatment is indicated in Shotha, Daha, Paka, Raktakshya Asrkrasuti, Vatarakta, Kustha, shoola-Vata vyadhijanit etc.

Blood letting can be done by Shrunaga, Jalouka, Alabu or Siravedh

D) Snehana and Swedan Therapy

Sweda is of four kinds: Viz. Tapa, Usma, Upannaha and Drava

Basking in the Sun, wrestling, brisk walking, covering the body with thick blankets, fasting, worry, strenuous exercise, carrying heavy loads, all these subserve the purpose of Swedana for relief from diseases.

Avagaha Sweda

Drava Sweda is done by filling a bath tub with warm decoction.

Parenteral routes

Introducing drugs directly into the blood stream through an artificial wound.

Soochikabharana Rasa

One Pala of Visha and one Shana of Suta are well macerated together and placed inside earthen plates which are sealed with mud plaster, dried and kept inside a pot containing sand. The pot is then kept over a oven and fire applied from below two Prahara increasing its intensity gradually. After cooling, the plates are opened and the powder adhering to the upper plate is transferred into a glass bottle without exposing it to air. The dose will be that much only adheres to the point of the needle. An incised wound is made on the head, the medicine applied into it and rubbed gently. By combining with the blood it brings consciousness to person who is under Murccha, Sannipata or Sarpa Dansha. If the temperature of the body increases or patient complains of burning sensation sweet syrups are given to him for drinking.

Conclusion

By studying all this we can conclude that Ayurved treaties have explained number of techniques of drugs administration through different routes and also number of drug recepies which are simple, easy to prepare and efficacious and make drug administration simple. Not only GI tract but also parenteral route is explained in Ayurved-eg. Soochikabharan Rasa. Clear definitions of pharmacological terms and varied kinds of routes of administration of drugs with all aspects of Ayurved in the ancient times has proved the beauty of this science. It is very worth to see plasma half life, bioavailability of drugs etc. in clinical pharmacology, when different routes of administration of drugs are used.

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