

A REVIEW ON IMPORTANCE OF NOVEL DRUG DOSAGE FORMS IN AYURVEDA W.S.R TO MODERN DOSAGE FORMS

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ABSTRACT

Ayurveda being ancient science, acharyas mentioned chikitsa chatushpadas like bhishak, Dravya, rogi, upastha. Where Dravya was given 2nd prime importance in treatment of diseases. In Ayurveda, there is description of panchavidha Kashaya Kalpana namely swarasa, kalka, kwatha, hima, phanta and their upakalpanas intended to use both externally and internally for therapeutic benefit, but these kalpanas cannot be used as such, as they need to undergo few modifications. In present sophisticated society demand for finished products lead to adaption of newer modern and ayurvedic pharmaceutical technology in manufacturing of ayurvedic formulations to meet the trends of present society. Importance to develop new dosage forms was given in such a way that the new dosage form is designed considering compatibility

palatability, easily availability, easy administration, smaller dose, convenient method of usage and enhanced bioavailability to the patient. It is also used to increase the shelf life of the particular preparation. These kalpanas explained in the classics are modified making it, compactable without losing the efficacy of a drug, considering ideal drug qualities mentioned by charaka which also involves yukti of the physician to modify the medicine while considering principles of samyaga, vibhaga, kala, samskara with respective to desha, kala, bala etc. In this view as per need, ayurvedic drugs are modified into convenient forms like tablets, capsules, dispersible tablets, suspensions, capsules, dusting powders, gels, creams,

liniment, sprays, transdermal patches, granules, syrups, Nano form of medicine etc, based on solids, liquid and semisolid forms.

KEYWORDS: Novel dosage form, Panchavidha kashaya Kalpana, Ayurvedic pharmaceuticals, saviryata avadhi, shelf life.

INTRODUCTION

Ayurveda science of life believes in trisutra and Chikitsa chatushpada where aushada is being the prime factor in treatment of disease conditions and maintenance of good health. Aushadhi's are administered according to the patient's condition and convenience as a single herb can be given in different dosage forms like swarasa, kalka, kwatha, churna etc without altering the potency of the drug and basic concepts of ayurveda. The need of drug dosage modification is much essential in geriatric and paediatric group to avoid large dose consumption, mask taste in bitter drugs by converting into syrup, suspensions, etc by adding suitable additives and adopting modern pharmaceutical procedures.

By considering the lacunas in medicine administration, and lesser shelf life period various attempts are made to modify Aushada into most convenient dosage forms. Ex- kwatha classically are meant for instant use modern emerging pharmaceuticals have modified it into tablet form for convenient usage and increase their shelf life with preservatives. Contemporary and several Ayurvedic pharmacies have already implemented these novel trends and launched several new dosage forms apart from traditional under cover of conventional knowledge. There is an immense need to adopt most effective and palatable dosage forms in contemporary era without compromising the therapeutic efficacy. However selection of dosage forms and dosing frequency is influenced by many factors like bala, kala, dosha, dushya, koshta, satmya, prayoga marga, anupana, vaya, ahara Avastha etc.^[1]

Based on physical properties of panchavidha Kashaya Kalpana and their upakalpanas, ayurvedic drug dosage forms can be grouped into solid, liquid and semisolid dosage\ kalpana forms.

Table no. 1: Classification of Various Dosage Forms In Bhaishajya Kalpana.^[2]

S.no	Solid dosage forms	Liquid dosage forms	Semi-solid dosage forms
1.	Churna	Kashaya	Avaleha
2.	Vati	Sneha	Kalka
3.	Guggulu	Sarkara	Malahara

4.	Varti	Swarasa	Sikata taila
5.	Kshara	Hima	Lepa
6.	Masi	Phanta	Upanaha
7.	Ayaskriti	Paniya	-
8.	Lavana	Pramathya	-
9.	Sattwa	Ushnodaka	-
10.	Guggulu	Kshirapaka	-
11.	Gudapaka	Laksharasa	-
12.	Khanda	Mamsarasa	-
13.	Rasakriya\Ganavati	Mantha	-
14.	-	Udaka	-
15.	-	Panaka	-
16.	-	Arka	-
17.		Sandhana	

Table no. 2: Classification of Various Dosage Forms In Rasashastra.

Solid dosage forms	Semisolid dosage forms	Liquid dosage forms
Kharaliya rasayana	-	Druthi kalpana
Kupipakwa rasayana	-	-
Parpati rasayana	-	-
Pottali rasayana	-	-
Bhasma\Pisti	-	-

Importance of novel drug dosage forms

Novel drug delivery system is a novel approach to drug delivery system that addresses the limitations of the ayurvedic drug delivery systems. Novel drug delivery system aims to eliminate all the disadvantages associated with conventional drug delivery systems. Its advantage is that the efficacy of the drug is enhanced, patient compliance is increased, and avoidance of repeated administration of drug and therapeutic value of the drug is increased. Drug modification increases the shelf life of certain formulations. Dosage can be established according to Roga, Bala, Prakruti and Vaya of the patient.

Recent common oral dosage forms developed in ayurvedic pharmaceuticals

Granules:- Importance of granule formulations are to have uniformity of drug distribution in the product, densify the material, enhance the flow rates and rate of uniformity, to facilitate metering or volumetric dispensing, to reduce dust and to improve the appearance of the product types of granules are as follows

A. Effervescent granules: Effervescent forms of granules have many advantages over conventional pharmaceutical forms. They act as a substitute for liquid forms because active ingredients which are not stable in liquid form are often more stable in effervescent granule form. These granules are travel friendly, easy to administer, useful in paediatric

and old age group who are not able to swallow capsules or tablets. They are palatable form of medicine as they helps to mask the bad taste of certain drugs. This may help to avoid the gastric side effects of certain drugs. In certain cases, they can shorten the drug absorption rate in the body with quicker therapeutic effect.

- B. Rapid release granules:** Rapid release granules benefit those drugs where, absorption is highly dependent on the dissolution of the drugs in the gastrointestinal tract. These granules enhance the dissolution activity of bioactive compounds to increase the rate of bioavailability of poorly water-soluble compounds.^[3]

To overcome the issue of palatability, selflife, dose fixation attempts are made to develop avalehas, churnas, Kashayas into granule forms. Ex- Shatavari granules, Yastimadhu granules, sithopaladhi granules, Talisadi granules kamsaharitaki granules, Mahasudarshana kwatha granules etc. Granule form of medicine can be modified into dispersable and effervescent tablets. These products undergo several pharmaceutico and standardisation studies. These are easy to administer and has longer shelf life. Prevent segregation of powder can be achieved in granule form.

Tablets:- Tablets have been one of the most widely used oral dosage form of medicine right from it came into existence. Paediatric age group and few people who find difficulty in swallowing tablet these are modified into suspension form, few kashayas, churna forms are converted into tablets form.

- A. Fast dissolving tablet:-** These tablets provide medicine to the patient without difficulty in swallowing. These tablets are designed in such a way that they first disintegrate and then swallowed without the need of water as compared to other ayurvedic dosage form. The advantage of it, is that it is very ease to administer; water consumption is not necessary, rapid rate of dissolution, proper absorption of the drug occurs and increased rate of bioavailability.^[4]

- B. Rapid disintegration tablets:-** These tablets are advantageous in administration to the patients who are unable to swallow, such as the bed-ridden patients, paediatrics, geriatric and psychiatric patients. This is a rapid drug intervention, to achieve increased bioavailability, convenient for administration for travellers, busy people who do not always have access of water, risk of choking and suffocation is avoided thus providing improved safety.^[5]

Paediatric age group and few people who find difficulty in swallowing tablet these tablets are modified into tablet form, few kashayas, churna forms are converted into tablets form. Swarasa kalpanas are converted into gana vati (Tablet) form due to shorter shelf life, avoid contamination and palatability issue. Perfect dose determination, children compatibility and has longer shelf life. Many other forms of tablets like chewable and dispersible tablets are been modified.

Syrup:- Syrups are concentrated, viscous, aqueous solution of sugar with or without flavours. Syrups usually possess exceptional taste masking properties for bitter and saline drugs. Flavoured syrups are accepted readily by both children and adults.^[6] Flavoured syrups are vehicles of choice for drugs that are prescribed by paediatricians. Sugar free syrups are also available in the market for diabetic patients. These syrups are paediatric friendly, palatable, easy to dispense and mask the taste of drugs. In ayurveda various Kashaya, avaleha and panaka preparations are modified into syrup.

Ex- Patolakaturhinyadhi kashayam syrup, Kanchanara Kashaya syrup, Gandharvahasthadi kashayam syrup, Triphala Kashaya syrup, Kantakaryadi kashaya etc are modified forms of kashayas into syrup. Chinchpanaka syrup etc are modified panaka preparations of syrup. Dadimavaleha syrup etc are modified forms of avalehas into syrups. Syrups are children compatibility, Palatable, longer shelf life than ayurvedic kalpanas. These are various modified dosage forms for syrups available in the market.

Capsule:- Capsules are solid dosage forms. Drug substances are enclosed in it either as hard or soft shell or container which are soluble. This container or shell is usually made up of gelatin and other non-gelatin materials. The capsules are stable because powders show greater stability in capsule form than liquid dosage forms as the rate of reaction between drugs in the powder dosage form and atmospheric conditions is slower than the rate of reaction that occur in a liquid medium. Accurate dose fixing is possible. They are easy to administer, capsules are easy to swallow, Unpleasant tastes can be easily masked. The smaller particle size of powdered drugs leads to more rapid absorption in the gastrointestinal tract compared to tablets. Capsules reduce local irritation of the gastrointestinal tract which may be caused by the local concentration of a drug. They are well accepted by patients, attractive to patients and convenient to carry.^[7]

In ayurveda churna, parpati, Bhasma, satwa are modified into capsule form. Ghrita and tail are modified into softgel capsules by adopting various number of avarti Ex- Ksheerabala 101 capsules, Dhanwantara taila capsules, Gandha taila capsules etc. Rasaoushadis like parpati, bhamas preparations are made into nano form and dispensed few preparations like Swarna Bhasma capsule, Sankha Bhasma capsule, Bhallataka parpati capsules etc these have better rate of absorption in nano form. Few herbal medicine forms like churna, satwa preparations are available as sithopaladhi capsules, haridra capsules etc.

Recent common topical dosage forms adopted in ayurvedic pharmaceuticals

Classification of topical drug delivery system (based on physical state)

- Solid: Powder, Aerosol, Plaster.
- Liquid: Lotion, Liniment, solution, Emulsion, Suspension, Aerosol.
- Semisolid: Ointment, Cream, Gel, Jelly, Suppository.
- Miscellaneous: Transdermal drug delivery system.

Suspension:- Suspensions are biphasic class of materials in which one phase; a solid is dispersed in a second phase, generally a liquid. For those drugs which are poorly soluble oral suspension is considered the preferred dosage form because of safety. Quite often paediatric or geriatric patients cannot swallow a solid dosage form with difficulty. As a result, the solid dosage form is crushed, or in a capsule, the contents emptied in to a suitable vehicle made it into suspension form for easy administration by the patients. This shows a very cautious need for suspension dosage form.^[8]

In ayurveda churna, vati preparations are modified into suspension form as they improve taste of various bitter/unpleasant of drug by masking them, has higher rate of bioavailability, can be used as alternate medicine form for geriatric and paediatric age, It eases the delivery of low soluble therapeutic agents. For poorly soluble drugs suspension form is preferred.^[9] Sitopaladi churna, triphala churna etc can be modified into suspension forms as sithopaladi suspension, triphala suspension.

Emulsion:- Emulsions are colloidal dispersions comprising two immiscible liquids (e.g., oil and water), one of which is dispersed as droplets within the other. Stable emulsions are effective formulation approach for resolution of problems in drug and cosmetic agent delivery. For oral or topical use emulsion systems may be easier to administer or apply than suspensions. The water wash-ability of topically applied emulsions may be advantageous to

the user. Gastrointestinal absorption of poorly absorbed species can be enhanced in the form of an emulsion.^[10]

In ayurveda tailas are most oftenly modified into suspension form. Emulsion improves penetration and absorption rate, oil sensation is easily removed, it is possible to include 2 incompatible ingredients one in each phase of emulsion. Ex- Nalpamradi taila emulsion, Eladi taila emulsion. In recent trends many cosmetic products are marketed in emulsion form for better ease of usage.

Gels:- Gels are transparent semi-solid preparations that are used as pharmaceutical topical formulations. They are stable for longer period of time have good appearance. They are suitable vehicles for applying medicaments to skin and mucous membranes giving high rates of release of the medicaments and rapid absorption.^[11] They are more oftenly used in cosmetics.

In ayurveda tailas can be modified into dosage forms as gels as they would be less greasy, easily removable from skin, adhere well to applied site, stable over time. Few gel preparations in ayurveda are Aloe vera gel with essential oils, Manjista gel, Kesar gel etc. Many ayurvedic cosmetic gel preparations are available in the market by imbibing potential medicated oils into gel they are marketed for various beauty enhancing ailments in the form of acne gel, detan gel, brightening gel etc. Therapeutic pain relieving gels are modified by using medicated pain relieving oils. Gels have good adherence property they are biodegradable and biocompatible. Retention time of gels are higher than the other dosage forms like creams and ointments. It acts as a protective layer on the site of application and easy to wash after application. Gels provide excellent spreadability and cooling effect due to solvent evaporation.^[12]

Ointment: Ointments are semisolid dosage form for external use on skin or mucous membrane for protective, therapeutic or cosmetic purpose. Besides their medicinal benefits ointments also provide emolliency and other desired benefit.^[13] There are two methods to impart the ingredients into ointment base that is by trituration and fusion. In trituration method the finely subdivided insoluble medicaments are evenly distributed by grinding with small amount of the base followed by dilution. In fusion method, the ingredients are melted together in descending order of their melting point and stirred to attain homogeneity.

Ointments are most commonly used in treatment of various dermatological conditions like acne vulgaris, infections, eczema, wounds on skin, skin burns, Scars etc.^[14]

Ointments protect injured area from environment, convey the medication to skin for specific effect, permit skin to rejuvenate, provides skin nourishment. In ayurveda taila, ghrita and lepa kalpanas are modified into ointment for more convenient usage, longer shelf life, high market acceptability, patient friendly most commonly available ointment forms are shatadhouta ghrita ointment, jatyadi taila ointment, Manahshiladi lepa ointment etc.

Liniment: Liniments are liquid dosage forms for external use to lessen the discomfort, minor aches caused by injuries and muscle strains. Liniments have rubefacient nature due to some ingredients, which is beneficial for sportspersons to warm up, before starting a sporting activity, to avoid any muscle damage. Taila kalpanas are modified into liniment form these medicated tailas are applied topically act as instant pain relievers, alleviate pain, in sore muscles, inflamed muscles and soft tissues, useful in sprain, muscle stiffness, bruises.

These medicated liniments show anti-inflammatory and analgesic activity in relation to Musculo-skeletal and neurological disorders.^[15] Most commonly used ayurvedic liniment is Mahanarayana taila liniment.

Eye drops: Eye drops are the most common dosage forms of topical drug delivery. Eye drops have little physical interference with vision. Many arka kalpanas can be converted into conventional eye drop by adopting sterile methods/technology). These herbal eye drops are used to treat cataract, eye infections and vision defects.^[16] More often used herbal eye drops are ITONE eye drops. These modified eye drops have more shelf life, easy to prepare and administer.

Transdermal patches: Transdermal patch is a medicated patch that is placed on skin for delivery of medication through skin into blood stream. The goal of this dosage form is to maximise the flux through skin and minimise retention and metabolism of drug in the skin.^[17] In ayurveda upanaha and lepana kalpanas are modified into transdermal patches through obtaining the extract of the particular drug.

These are more convenient and effective way of drug delivery method. It ensures that the compounds of the drug are delivered at specific rate. Most commonly transdermal patches are used as pain relievers, and are used in inflammatory conditions etc.

Suppositories: These are solid or semisolid dosage forms which are used for rectal, vaginal, and urethral administration. They are of different shapes and sizes, requirement, condition of the patient, site of administration, etc. The most important advantage of the suppository is its rectal use to deliver the medicaments and to reduce hepatic first-pass elimination and thus to enhance the drug bioavailability. Treatment of local infection is possible through the vaginal and urethral suppositories.

Suppositories melt, soften or dissolve and exert local or systemic effect.^[18] Few medications like phala varti, panchavalkala varti are most commonly used herbal suppositories in clinical practise. Moulding Varti into suppository and enhancing the horizons of therapeutic dosage are basic objective for a good therapeutic suppository.

Table no. 3: Various ayurvedic drug dosage modifications adopted in recent times.

S.no	Ayurvedic	Modern
1.	Churna	Capsule, Tablet, Granules
2.	Kashaya	Tablet, Syrup, Churna/sukshma churna, arista, arka
3.	Ghrita, Taila	Soft gel capsules
4.	Leha	Syrup, Chocolates, Granules,
5.	Malahara	Gel, Liniment
6.	Swarasa	Gana vati, Syrup (Amalaki), Dry powder, Juice
7.	Kalka	Churna, Patches
8.	Phanta	Arka, syrup
9.	Hima	Arka, syrup

Table no. 4: Benefits of modified ayurvedic dosage form.

Kalpana	Benefits
Churna, ghrita, capsule Churna into chewable tablets	Enhances appearance
Kashaya into granules and gana vati	Form
Asava, arista	Selflife
Kashaya into syrup and vatis	Palatability
Ghana vati	Drug orientation
Taila into linment	Increases therapeutic utility or potency
Ghruta, linment	Drug delivery

DISCUSSION

Evolution of dosage forms includes wide range of modification in medication from Vedic period to modern era. Corelating ayurvedic medicine manufacturing with modern principles of dosage forms helps to develop new and appropriate use of modern technology in pharmaceuticals. New technology improve the dosage forms and scaling up while maintaining the ayurvedic principles. Combination of these two sciences can give rise to new technologies

and processes that could help upscale production, decrease raw materials requirements etc. In present scenario due to increased population and growing demands, it becomes practically impossible for a physician to prepare medicine by himself. The advent of commercialization in Ayurvedic medicines at national and international levels lead to adoption of most convenient dosage forms.^[19] Quality Control and Standardization these are the major tools which are used to evaluate efficacy of a drug. Novel drug dosage form involves the formulation of the drug into a suitable form, such as churna into tablet and capsule form etc into more convenient ways.

These dosage forms have been found to have serious limitations in terms of higher dosage requirement, lower effectiveness, toxicity and adverse side effects. New drug delivery have been developed to overcome these limitations. Because of the difficulties in consuming crude form of ayurvedic medicines and also because of its less stability new dosage forms were adopted, these are meant to increase the bioavailability of the drugs and also to provide the effect of herbs directly on the site of action. So today modification becomes indispensable in an ayurvedic pharmaceutical industry and therefore done to make different formulations from the Panchavidha Kashaya Kalpana. Swaras kalpana modified into ghan vati tablets, Kwath kalpana modified into ghan vati, Asav kalpana etc. In Sharangadhar Samhita shelf for churna is 4 month which can be extended upto 2 years. Palatability is not a prime problem in vati Kalpana. Due to this Vati kalpana only modified in processing like Sugar coating, dispersible. Due to modification, shelf life of vati kalpana extended upto 2 years for herbal tablet and 5 years for herbomineral. Rasaushadhi can be modified into tablet, capsules and Sukshma Aushadhi Kalpana. For sukshmikarana of these Rasaushadhi follow the process of sukshmikarana for Ghana kalpa by using lactose sugar and mardana sanskara. This process may be reduces particle size and improve absorption, bioavailability, pharmacokinetic and pharmacodynamic actions. Due to Sukshmikarana of Rasaushadhi it can be undoubtedly prescribe in childrens, easily can prescribe swarnakalpa in poor patient due to low cost and act rapid due to quick absorption Changing in doses forms improve palatability, Shelf life. The main aim of dosage modification is to retain the therapeutic efficacy of the dosage form, improve shelf life and increase palatability of various dosage forms.^[20]

CONCLUSION

Because of enormous usage of ayurvedic products in our daily life the recent trend towards ayurvedic products is to be adopted. Panchavidha Kashaya kalapanas have a vast need to

overcome the lacunae present in them, ayurvedic pharmacies are developing new facts and trends to manufacture the required dosage forms. In this review, we find recent trends, need and importance to change the state of various ayurvedic dosage forms. By changing the dosage forms as per requirement in present era we can serve the humanity in a better way, it is achieved by modifying them into more convenient way.

These new dosage forms aims in enhancement of stability, protection from toxicity, increase bioavailability, solubility, sustained drug delivery, less total drug administration, portability. It can be concluded that there is an need to adopt these trends in ayurvedic novel dosage forms for achieving global acceptance.

REFERENCES

1. A literature review on ayurvedic dosage forms, compilation prepared by journal of ayurveda and integrated medical sciences <https://jaims.in/jaims/article/download/721/735/>
2. Different dosage forms of ayurveda, compilation prepared by munial Ayurveda <https://www.muniyalayurveda.in/blogs/ayurveda/different-dosage-forms-of-ayurveda>
3. Parikh DM: Handbook of pharmaceutical granulation technology. CRC Press, 2016; 1-3: 365-366.
4. Gauri S and Kumar G: Fast dissolving drug delivery and its technologies. The Pharma Innovation, 2012; 1(2): 34-39.
5. Patidar A, Mishra P, Main P, Harsoliya M and Agrawal S: A review on recent advancement in the development of the rapid disintegrating tablet. International Journal of Life Science & Pharma Research, 2011; 1(1): 7-16.
6. Lieberman HA, Rieger MM, and Banker GS: Pharmaceutical Dosage Forms Disperse Systems, 1998; 1(17): 341-345.
7. Remington JP: Remington: The science and practice of pharmacy. Lippincott Williams & Wilkins, 2006; 718.
8. Remington JP: Remington: The science and practice of pharmacy. Lippincott Williams & Wilkins, 2006; 718.
9. Lieberman HA, Rieger MM, and Banker GS: Pharmaceutical Dosage Forms Disperse Systems 1998; 1(17): 341-345.
10. Lieberman HA, Rieger MM and Banker GS: Pharmaceutical Dosage Forms- Disperse Systems, 1998; 2: 285.

11. Marriott JF: Pharmaceutical is compounding and dispensing. Pharmaceutical Press, 2010; 167.
12. Labarre D, Ponchel G, Vauthier C. Biomedical and Pharmaceutical polymers. Pharmaceutical press, London, UK, 2010.
13. Beringer P, Marderosian AD, Felton L, Gelone S and Gennaro AR: The Science and Practice of Pharmacy, Lippincott Williams and Wilkins, Edition 21st, 2005; 1: 828-830: 856.
14. Shilpa Patil, Topical dosage forms (Lepa kalpana);An explored treasure, International Journal of Green pharmacy, 2015; 9(4).
15. Winfield AJ, Rees J and Smith I: Pharmaceutical Practice E-Book. Elsevier Health Sciences, 2009; 216.
16. Beringer P, Marderosian AD, Felton L, Gelone S and Gennaro AR: The Science and Practice of Pharmacy, Lippincott Williams and Wilkins, Edition 21st, 2005; 1: 828-830, 856, 880.
17. Loyd v. allen, jr., Nicholas G Popvich, Howard C. Ansel, Ansels Pharmaceutical dosage forms and drug delivery systems, ninth edition, Woltera Kluwer publication, Reprint, 2011; 294.
18. Lieberman HA, Rieger MM and Banker GS: Pharmaceutical Dosage Forms- Disperse Systems, 1998; 2: 285.
19. Kaur Harpreet et al: Importance of Various Upkalpana In Ayurvedic Therapeutics IAMJ, July 2015; 3(7): 2156-62.
20. Kaur Harpreet et al: Importance of Various Upakalpana In Ayurvedic Therapeutics IAMJ, July 2015; 3(7): 2156-62.