

**A COMPILATION ON SHELF LIFE AND DRUG PRESERVATION
TECHNIQUES: CLASSIC AND CONTEMPORARY**

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ABSTRACT

Enhancing the shelf life of a prepared formulation seeks high priority for medication as well as distribution sector of concerned pharmaceutical industries. There are storage practices adopted by people since long as per the best of facilities availed at their respective time period. In *Ayurveda*, the science of longevity also shows us extensive methods adopted for preservation of a manufactured drug/formulation. Its beauty is reflected when the storage is divided grossly as quick consumables (*sadyo-sevana-kalpanas*) and formulations stored for longer duration. Following describes the techniques in detail about the drug preservation which can be applied in the field of *Ayurveda* for the better and efficient productivity and their storage.

KEYWORDS: Preservation, Shelf life, Drug

INTRODUCTION

A common belief prevailing amongst people in current era is *Ayurvedic* drugs have no date of expiry like other system drugs, they are completely safe, possess no adverse effect and can be used as per one's own convenience. It's not true anymore that when classics of *Ayurveda* are referred, there are direct references available for determination of shelf life of drugs and their modes of preservation. It is evident that there is emphasis for preservation techniques for the *Ayurvedic* formulations. Necessity of preservation of formulations in *Ayurveda* in current times holds high significance as people demands readily consumable medication for their health ailments. Hence it is important to increase the storage period of a drug. Few drugs are

available seasonally which are widely used as ingredients in many formulations, also needs to be preserved for a longer time to safeguard its active principle. Compared to *Brhatrayis*, it is in the *kaala* of *Laghutrayi's* those detail explanations about shelf life techniques are gathered. In *Brhatrayi's* the references available are scattered where as in *laghutrayis* the references are sorted and arranged more systematically. The storage of drugs is known as *Dravya-Samrakshana-Vidhi*. Here *Dravya* refers to the formulation, *Samrakshana* indicating the storage and *Vidhi* to the methods adopted for the storage. The term preservation and Shelf life co-exist. Shelf life of a drug can be determined on the basics of methods

adopted for prolonging the quality and efficacy of the drug

Dravya – Samrakshana Vidhi and Saveeryata Avadhi

Considering formulations enlisted in the classical *Ayurvedic* texts it is found that along with the preparations, their respective mode of preservation which enhances its shelf-life is described. When the main forms of formulations- *Sadyo-Sevana-Kalpanas* are to be taken instantly after their preparation, Aacharya *Sharangadhara* describes shelf life precisely for the secondary preparations¹. Going through verses of *Brihatrayis* we can understand that there are common practices that are followed in case for preservation and also exclusive methods mentioned for specific formulations

Saamana Samrakshana-Vidhi- common drug storage practices include procedure of their collection which is of supreme quality. The collected drugs are placed in containers that face the east direction, devoid of exposure to wind. There should be regular austerities carried out, where there is no exposure to fire, water, excess sun, dust, rodent and other crawling creatures². Moisture, adverse impact of all seasons upon the drugs are things to be taken care of from which chances of contamination is high³. Cloth, earthen pot, wooden planks and wall hangings also can be used to safeguard the drugs⁴. These drugs have to be kept in a *Bheshajaagara*. Concept of *Bheshajaagara* stresses the significance of essential storage facilities that ensures the quality and efficacy of the storage commodity.

Visesha Samrakshana-Vidhi- there are specific techniques instructed for many formulations that enhances its shelf life.

- *Jeevaneeya Ghrita* after preparation is told to be kept in a *Nava kalasha* (new pot)⁵

- In *Krimi Chikitsa*, *Sookshma Churna* done *bhaavana* with *Aswa Sakrit* is instructed to be kept in a new pot that is hidden in a safe place⁶

-*Bhrama-Rasayana* subjected to *Antar-bhoomi Sthapana*⁷

-*Phala-pippali* in *Vamana Kalpa* kept in *Gomaya Lipta Apakwa Kusha Puta*⁸

-*Mahaneela-Tailam* subjected to *Aaditya paaka*⁹

- *Kshaara-anjana* kept in *Loha-paatra*¹⁰

- *Ghrita* kept in *Kamsyapatra* in treatment of *Raktabhishyanda*¹¹

These are few formulations that are found in the classics where the methods to preserve are also explained along with them. From the above references assumptions can be made as- new pots used to store the drug can keep them neat and disinfected. *Antar-bhoomi Sthaapana* can prevent exposure to sun and can provide temperature maintenance which favours its *paaka*. *Gomaya Lipta Apakwa Kusha Puta* may enhance the insulation effect for collected *Phala-pippali*. Subjection of *Mahaneela Taila* to *Aaditya paaka* can ensure the complete utilization of active principles to the *taila* and its storage.

On a contemporary side mainly the extension of shelf life and preservation holds a greater importance as new medicines are emerging at a faster pace which needs to be stored for a longer duration which benefits the person in need. Shelf life matters from the date of manufacture of the drug up to the

date till it retains the approved specification. The drugs that cross the shelf life mentioned for them are termed as 'expired drugs'. In modern science of drug preservation the prime objectives are to safe guards the formulation from external influential factors such as temperature, moisture, and contamination. An innovation in the field of drug preservation is establishing procedures that accelerate its ageing process. This can enhance the shelf life of drug in productive scale. Over such drugs the number of experimental trials can be increased that results in more permutations and combination derivatives of drug. This technique set forth evolution in the field of pharmacology

Preservation Techniques

Techniques adopted for preservation are innumerable, that can be broadly classified as physical, chemical and biological preservation techniques.

Physical preservation- To refrain the drug getting decomposed physical preservation is applicable by saving them from light, moisture, temperature. Proper packing of materials and segregation of the commodities are modes of preservation. Film coating, sugar coating in sealed containers are recent advancements that are developing.

Chemical preservation - higher risk of contamination is prevented by adding antioxidants to those drugs that have a chance of easy spoilage. The cause of contamination can be oxygen, carbon dioxide or water vapour.

Biological preservation- applicable to drugs that disintegrate due to contamination caused due to micro-organisms and

enzymes. Sterilization is the most recommended procedure to achieve biological preservation. It ensures highest modality of prevention by achieving condition which free from living micro-organisms.

Considering the evolving modalities of science and technology, the recent advancement in the preservation techniques adopted is through radiation.

Radiation preservation- the selected drug is intentionally subjected to radiation waves with objective of preserving its quality without altering its mode of action. The drug is exposed to ionizing radiation from an emanating source for pre-determined time period so as the desired active principle of the drug is retained. Radiation preservation up to 10 kGy is stated to be safe for human consumption bases on the experimental studies by expert groups. Approved by I.A.E.A¹², F.A.O¹³, W.H.O¹⁴, the *Ayurvedic* drugs can be facilitated for radiation preservation. The dose limit for radiation process in *Ayurvedic* herbs and their product are considered under three categories

-Insect disinfestations- with minimum dose limit 0.25kGy and maximum upto1kGy

-Microbial decontamination- with minimum dose limit 5.0 kGy and maximum up to 10 kGy

-Sterilization with minimum dose limit 10 kGy and maximum up to 25 kGy

These are officially approved measures mentioned in G.I.P (Global Irradiation Practices)

DISCUSSION

Drug spoilage occurs mainly through microbial contamination, resultant enzymatic degradation and also

biodegradable nature of liable photochemical due to exposure to air, heat, light. Chances of bio degradation are more in case of drugs which have high tannin content and chlorophyll content. It is learnt that the chlorophyll and tannin contents remain bio active in presence of moisture protecting the physical properties by preventing contamination of any sort as well as bio degradable nature is the main objective of preservation. *Ayurvedic* literature emphasize the natural ways of preservation of finished products either by taking care of the moisture content by drying and further regulating moisture content adding sugar, jaggery . Self generated alcohol can limit replication of microbes. The particles of drug remain encapsulated in form of *vati/ Gutika* thus reducing surface area and exposure leading to preservation for longer shelf life. Recent advancements in Chemistry, Biotechnology, Biophysics, Radiology has helped in achieving the goals of bio preservation for prolonged period compared to conventional drug storage practices

CONCLUSION

Drug formulations that can be susceptible for spoilage on a high rate shall be subjected for exclusive and extensive research for improving the shelf life of medication. Not only the preservation techniques, but also focus to be given on studies that rule out factors responsible for deterioration of individual formulation. Stability of herbal drug is difficult to determine as it has multiple phytochemical constituents. Hence techniques of modern preservation have to be adopted in a way convenient it can be used in field of *Ayurveda*. Thus one can

bring effective technique for storage of Indian System of Medicines.

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Source of support: Nil

Conflict of interest: None Declared

Cite this article as

Dr Satish Pai: A Compilation on Shelf life and Drug Preservation Techniques: Classic and Contemporary: A Review ; VI(1): 1673-1677