Preservatives in Ayurveda - A Review

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Abstract

Number of formulations (Kalpana) such as Svarasa, Kalka, Churna, Kashaya, Avaleha and Ghruta has been documented in authoritative books of Ayurveda. Each formulation has a period of optimum efficacy which is termed as “Saveerytavadhi”. It is seen that some Kalpana like Svarasa, Kvatha etc have minimum shelf life and are considered to be Sadyo-Sevaneeya. Few others such as Churna, can be stored for few months whereas the formulations like Sandhana, retain their potency for many years. Considering these factors, a literary review is carried out to find a reason behind the variation in shelf life. It is found that the few ingredients used in the formulation themselves acts as preservatives ghrita, Madhu, Guggulu, Lavana and other such ingredients added in the formulations show the property of preservative. Even some Samskara such as shoshana (drying) adds to the property of preservation. It is pertinent to note that these ingredients and processes add preservative effect apart from their pharmacological and therapeutic properties. Further it is observed that the factors like presence and absence of moisture, the media of extraction of phyto-constituents, perfectness in the end stage of preparation of formulation (Siddhi Lakshana) and time of adding the ingredients also plays a major role in deciding the shelf life. This paper deals in detail about the preservative property of Ayurvedic formulations.

Introduction:

During the Ancient time food storage was vital to society as the collection of the food was difficult because of lengthy rainy seasons, thick forests, threat from wild animals and poor road connectivity and no mechanized transportation system. So effective storage was very important and probably because of this, the concept of preservatives came into existence.

Few of Herbal ingredients like curcuma, pepper, cumin, mustard have also been used in food and folkloric medicines since ancient time as flavoring agent and food preservative. Apart from the above exclusive, use of herbal drugs in preparation of medicine was also in practice. The medicines used to be prepared in different dosage forms depend upon multi factorial variations. However, it is observed that different dosage forms of same drug have different shelf life which decides safety and efficacy of medicine. Basically, there are only five dosage forms (Pancha-Vidhi-Kashaya Kalpana) in Ayurveda. Many other dosage forms under the heading of secondary are evolved with the intentions of potentiating the drug and to increase shelf life. Based on repeated observation and practical knowledge ancient scholars of Ayurveda could decide the shelf life of individual dosage forms. For example, the powder of drugs has 2 months shelf life, tablets have 1 year, Oil and ghee have 16 months and fermented preparations have infinite shelf life1. So, a logical approach about the ingredients and processing techniques involved were made to analyze the preservative action.

Preservative is a substance which is added to a formulation to prevent or inhibit the growth of micro-organisms in the preparation2. When the property of preservation is found in the substances seen in nature it can be termed as a Natural preservative. This type of preservatives also acts against oxidation and mould formation of preparation.

Ideally a preservative should have following attributes3

1. Free from toxic irritants or sensitizing effect at any concentration used externally or mucous membrane
2. Stable to heat and also for prolonged storage
3. Free from gross incompatibility with other ingredients in the formulation and with packaging material
4. Active at low concentration and should retain its effectiveness for wide range of pH
5. Effect against wide range of microorganisms
6. Should be odorless and colorless
7. Nonvolatile in nature
8. Able to retain its activity in the presence of metallic salts

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Shelf life of a medicine

The time from the date of manufacturing of the medicine to the time till which the medicine has sufficient potency to bring about the desired therapeutic action can be termed as shelf life or expiration date.

Material & Methods:
A detailed literature survey was made in present study to find out the natural preservative action of common ingredients that are used in Ayurveda formulations. The search was extended to all literatures on print and digital media. The possible ingredients were listed out and the individual ingredients were researched in detail for their possible role as preservatives. During study following observation were made:

Observations:
After a detailed literary search, it is found that few ingredients added in formulation as a part of preparation themselves act as a preservative. Few method and modification in pharmaceutical process also contribute to preservation.

1. Madhu (Honey)
In most of the formulations Madhu is used as an ingredient e.g. Avaleha and Ayaskriti. Honey is active against bacteria, it creates viscous barrier against bacteria and infection i.e. it creates a sticky barrier between itself and other ingredients in the product. The acidic pH (4.0) of honey retards the growth of certain bacteria such as E. coli. Madhu has a water content of 0.5-0.6 which retards bacterial growth. Honey contains glucose and an enzyme called Glucose oxidase, under the right condition the glucose oxidase have an ability to break glucose to hydrogen peroxide and as high osmolality which renders the microbial growth.

2. Sugar
Sugar is used in many of the Ayurvedic formulations such as Sharkara Kalpana, Guda Kalpana and Khanda Kalpana. Sugar in high concentration causes bacteria to lose water by osmosis and it doesn’t have any cellular mechanism to pump back the osmotic gradient. Being partly hydrolyzed into reducing sugar, it retards oxidation. In hypertonic solution sugar desiccates the cell retarding microbial growth and rendering potential pathogen inert. The sugar concentration is expected to be 66.7% in the solution which is required for the prevention of growth of microorganisms. Syrup of IP concentration is 66.7% w/w, syrup of U.S.P concentration is said to be 85% w/v. Both this concentration has inert microbial growth. In Ayurveda the ratio of sugar in Khanda Kalpana is 1:3-1:6, in Sharkara Kalpana is 1:2, in Guda Kalpana is 1:0.75 to1:1; all these concentrations have inert microbial growth.

3. Self-Generated Alcohol
Fermentation is an incomplete oxidation of sugar into ethanol and carbon dioxide in absence of oxygen brought about by the enzyme invertase secreted by yeast cells. The drugs which are used in Asava and Arista are preserved by self-generated alcohol. The percentage of alcohol extends from 9% to 12% which helps in preservation. It contains Madhu-½ tola which act as self-preservative.

4. Lavana (Salt)
Lavana is used as a preservative in Indian cuisine since time immemorial. Salt is considered to be possessing Anti-bacterial activity. As bacteria needs wet environment to grow, salt prevents the watery environment the bacteria needed to grow. This property is because the salt is very good at dehydrating and absorbing water from anything it comes in contact with e.g. pickle and Lavana Kalpana. Lavana Kalpana have infinite shelf life if stored properly.

5. Desiccation
Literally desiccation means ‘to dry out completely’, or to preserve food by removing the moisture. Here the water and heat liable extractive are extracted by continuous heating to remove the complete water content e.g. Ghanasara and Kshara.

6. Anhydrous
Literally anhydrous means ‘without water or water of crystallization.’ Here the wet drugs or moderately wet drugs are dried and powdered to remove the moisture content e.g. Churna Kalpana.

7. Plant self preservation
Guggulu contain resin and essential oil which act as preservative. It has healing property, antifungal and antiviral effect. The volatile oil present in it has antimicrobial activity. Adding of Guggulu in preparation of Vati Kalpana, increases its shelf life to five years.

7.a. Antioxidant
Auto oxidation causes rancidity and spoiling of formulation which leads to discoloration and change in taste, texture and odor. This leads to essential ingredient loss and shorten shelf life. Antioxidants which are present in pharmaceutical formulation prevent oxidative degeneration of drug and thus prevent rancidity. The antioxidants have great affinity to oxygen and when added to formulation they offer protection to other oxygen sensitive drug. E.g. Amalaki, Shatavari, Haritaki, Vibhitaki, Chandana, cumara. Tulsi, Brahmi,Yastimadhu, Ashwagandha, Haridra, Lashuna.

7.b. Taila
It contains naturally occurring preservative sesamol and sesamin. It contains Vit E which is rich in antioxidant. It contains high percentage of polyunsaturated fatty acid (PUFA) which helps to stay in liquid state at room temperature by preventing rancidity.

7.c. Ghrita
It is used in many of formulations such as Sneha Kalpana, Malahara and Avaleha and so on. It is a rich source of antioxidant, it also contains beta carotene, vitamin A, D, E and K. Because of its antioxidant property it acts as a preservative. Ghrita is not hydrogenated or oxidized at room temperature.
8. Others
8.a. Arka14
Arka is used as preservative in primary Kalpana like Kvatha. It is unique preparation in which essential oil from herbal drugs are extracted through distillation method. The essential oils and flavonoids present on the distillate act as a preservative.

8.b. Rasa Aushadhi15
Addition of Kajali in various herbal powders along with triturating under pressure will make to enhance storage by increasing shelf life of the respective herbs. In clinical observation it is noted that the drug effect is more after addition of micro quantum of well-prepared Kajali. It is also helpful in reducing the dosage of herbal compound. Addition of Rasa Bhasma and Sindura in Churna helps in preservation action.

8.c. Panchabhoutka Sanghatana16:
The strong bond made between similar Mahabhutas of two Rasas act as preservative bond. Madhura rasa - Prithvi + Apa
Lavana rasa - Agni+ Apa
If this bond breaks, the Prithvi and Agni in above two Rasa would combine to produce Amla Rasa; this is why sweet substances turn sour when spoiled. Such changes also take place within the drug or diet articles even without any preservative and this is why Madhura substance turns Amla after some time.
- Amla rasa – Prithvi+Agni
- Katu rasa - Vayu+Agni
If this bond breaks the Prithvi and Vayu may combine to form Kashaya rasa. This is why Amla substance when spoiled turns into Kashaya Rasa. The same principle applies to the preservation of Kashaya by Tiktha Rasa.
- Kashaya rasa - Prithvi+Vayu
- Tikta Rasa - Akasha+Vayu

Discussion
After detailed analysis of the preservative techniques used in Ayurveda formulations, it is observed that, there are some important aspects to be noted. First aspect is that, the ingredients used in formulation by virtue of their property impart preservative action apart from its therapeutic benefits. For example, honey is one of essential ingredient in most of the likable formulations (Avaleha). Sugar is an important ingredient in most of the syrups and few Avaleha. They possess natural preservative action.

The second important factor is the processing techniques involved in the preparation of medicine also play a major role in increasing the shelf life. For example, in the preparation of Avaleha, frying of ingredients, dehydration of ingredients, Addition of Prashepaka, addition of honey and time of preparation of formulations etc. plays a major role. The third important factor is storage of medicine. For example, the storage of raw material and prepared medicines in a clean air tight container naturally increases its shelf life.

Conclusion
After detailed literature search about preservatives in Ayurveda formulations, it is can be concluded that The preservative action of preparation is because of three important factors,
1. Ingredients used in formulation
2. Process involved in preparation
3. Methods of storage of medicine.

The shelf life of the formulation depends on following factors,
1. The quality of the herbs and ingredients used in medicine
2. Nature of the herbs used (Wet or Dry) in the formulation
3. Dosage form (Primary/Secondary) of medicine
4. Processing techniques like Agni sannikarsha (Heating), Bhavana (Grinding), Vasana (Flavonoids), Kala Prakarsha (Time factor), Desha (Place) and Bhajana (Vessel)
5. Ingredient that usually contribute as natural preservative e.g., Sugar
6. Additive that usually contributes as natural preservative eg: Honey

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