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REVIEW STUDY ON MODERN EQUIPMENTS RECENT ERA IN RASASHASTRA

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ABSTRACT

Rasashastra is a specialized branch of Ayurveda which deals mainly with metals and minerals. Mercury is a core member of this ancient science. The pharmaceutical preparations are made under this science has an integral part of Ayurvedic therapeutics. After long and rigorous pharmaceutical procedures these metals and minerals are converted in to such a form that they can show their therapeutic efficacy without any adverse effect. Shodhan, Maran, Jarana, Murchhana, Patana, Satvapatana etc. are the procedures which are used for the preparation of various formulations. In ancient times Rasacharyas developed various equipment's and tools to perform these complex procedures. The tools and arrangements by which we can control the procedures of preparation in Rasashastra they are called as "Yantras. In present work, an attempt has been made to provide the information regarding "Yantras" used in the ancient and recent era with modern equipment".

KEYWORDS: Ayurveda, Yantras, Modern equipment's.

INTRODUCTION

Rasashastra and Bhaishajya Kalpana basically deals with the ayurvedic pharmaceutics. The procedure commonly used for the processing of Maharasa, Uparasa, Sadharana rasa, Dhatu, Upadhatu etc. are Shodhan, Jarana, Marana, Amrutikarana, Satvapatan, Patan, Dravana etc.

To perform these procedures systematically some tools and equipment's were used, these were called "Yantras". In Anand kanda it is mentioned that "the things by which we control the "Parada" are called as "Yantra".[1] In Rasaratna Samuchchaya Yantras are defined as "the measures which are used to perform swedanadi procedures and to control the mercury, known as Yantra".[2] In various rasa classics lots of Yantras are mentioned. From beginning of the Rasashastra. "Yantras" were developed as per their uses in various mercurial procedures. So we can see in the ancient classics these appliances are modified and developed time to time as per their need.

Due to globalization there is a need of advancement in the equipment's helps in the easy way of preparing any kind of preparations with decreasing in time duration with advanced technologies in the equipment's, for large scale production, to avoid fluctuation of drug concentration So study and analysis of these modern equipment's will help in advancement of Ayurvedic pharmaceutics.

AIMS AND OBJECTIVES

Aim of this literary research is to review the details of ancient and modern equipment's used in the recent era.

MATERIALS AND METHODS

Etymology of Yantra

Measures by which we could control, regulate and preserve the Parada and other minerals and metals are called Yantra.[3]

Definition of Yantra

Apparatus used for the shodhan, marana, swedana etc. purposes of Rasa, Uparasa, Lohadi are called Yantra.[4] Yantras are instruments which are used to control Parada by performing procedures like swedana[5] etc.

Table 1: Showing the equipment's used in ancient and recent era in the various preparations.

Aushada yoga	Ancient Equipment's	Modern Equipment's
Heat source	Chullika Angarika kosthi	Gas stove Electric heater Hot plates Steam etc.
Svarasa/putapaka svarasa	Khalva yantra	Juice expeller

	Cloth Angara koshti	Wet grinder
kalka	Khalva yantra	Mixer grinder
kwatha	Chullika Mud pot cloth	Gas stove Hot plates Electric boilers Steam jacket boilers
Hima/phanta	Mritpatra and sarava Manual maceration	Stainless steel vessel with lid simple/multiple maceration Percolation
Churna	Ulukhala yantra Khalva yantra cloth	Pulverizer Pastel and mortar Ball mill Hammer mill Edge and end runner mill Disintegrator Bohr stone mill Hand mill Colloid mill
Mixing of powders	Manual	Mechanical mixing Off set, angled, push pull, turbine or baffled mixing. blender
Vastragalana	Cloth	Sieves of varied number Range from 10 to 120
Mantha	Manual churning	Mechanical churner
Arka	Tiryak patana yantra	Simple distillation Fractional distillation Steam distillation Vaccum distillation etc.
Soshana (drying)	Drying in shade or hot sun	Hot air oven Drum dryers Tray or shelf dryers Rotatory dryers Vacuum dryers Freeze dryers etc.
Avaleha /Rasakriya/ Khanda/Sarkara	Chullika	Gas stove, electric heaters Dish pan, stirrer
Guggulu	Chullika	Gas stove, dish pan, mixer grinder
Vati (tablets)	Manual rolling of pills	Tablet making machine Single punch machine Multi punch machine Rotatory tablet machine High speed rotatory Multilayer rotatory tablet machine Tablet coating machine
Ghrita / Taila	Chullika	Gas stove Electric boilers Hot plates Steam jacketed dish pan

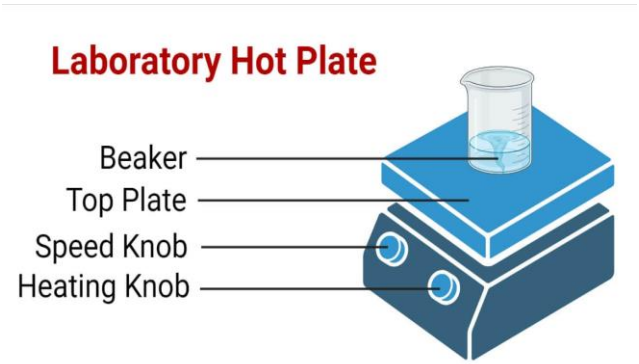
Sandhana (fermentation)	Mritpatra sarava vastra	Wooden drums Syntax drums Cement tanks Glass jars of bigger size Stainless steel vessels

1) Hot plate[6]

A hot plate is a device used to heat samples, solutions, and materials uniformly without the danger associated with the open flame at precise temperature.

Advantages –

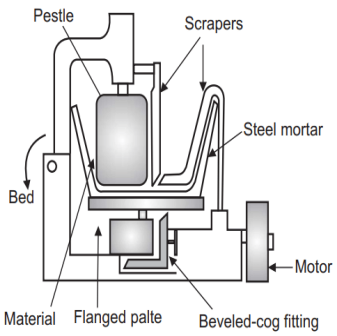
- Are conveniently portable.
- Mechanical stirrers are being replaced with hot plate stirrers because they require less work, are quieter, and are Considerably more effective.



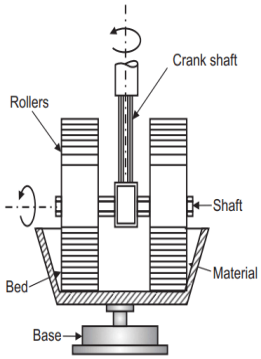
2) Grinders[7]

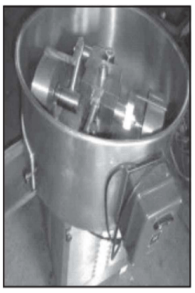
Grinding is a process in which the substances are reduced in to coarse particles or fine powders. The following are the equipment's are

- Edge and End Runner Mill[8] – Size reduction by compression can be carried out on a small scale using end runner mill and edge runner mill which are mechanized forms of mortar and pestle type compression commination.



- Hammer mill[9] – The main component of hammer mill is a row of hammers that are hinged on a central shaft and contained in a strong metal container. Size reduction is achieved by impact. The principle of hammer mill is bases on the impact between a rapidly moving hammer mounted on the rotor and powder the material.





- Ball mill[10] – Is used to grind the materials to get a course or fine powder. Ball mill principle work on impact and attrition, impact means pressure exerted by two heavy objects, attrition means reduce the size of material when they colloid by heavy weight (ball).

- Disintegrators[11] – It is used for coarse grinding of the medium hard mineral products. It works on the principle of impact and attrition.

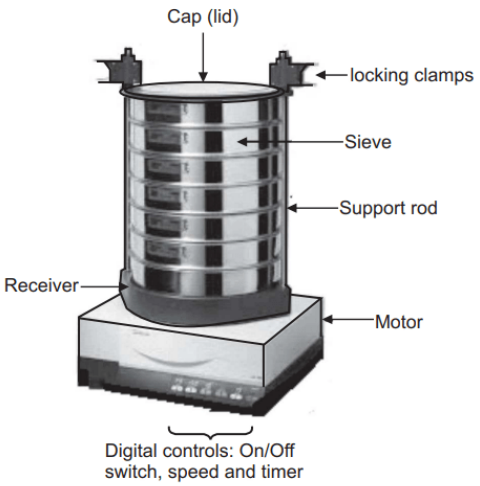
3) Mechanical mixing[12]

Mixing is a unit operation in which a uniform mixture is obtained from two or more components, by dispersing one within the other. Equipment's used for mixing are triple roller mill, paddle mixture, turbine mixture, propellers, sigma blade mixer, blenders.

4) Sieves[13]

The sieving technique is used widely to separate the fine powder by utilizing sieves of specific sizes. Types of sieving

- Safety screening – Used to remove the contamination or foreign particles present in the powder.
- Grading – Used to separate the powders as per its required size.



5) Distilltion[14]

Distillation is a process of separating the component substances from a liquid mixture by selective evaporation and condensation. Types –

- **Simple distillation –** Is a process of converting a single constituent from a liquid in to its vapour, transferring the vapour to another place and recovering the liquid by condensing the vapours, usually by allowing it to come in contact with a cold surface.
- **Vaccum distillation –** Process in which the liquid is distilled at a temperature lower than its boiling point by the application of vaccum.
- **Steam distillation –** It is used to separate high boiling substances from nonvolatile impurities, to separate immiscible liquids.
- **Fractional distillation –** Process in which vaporization of liquid mixture gives rise to a mixture of constituents from which the desired one is separated in pure form.

6) Hot air oven[15]

It works based on the principle of dry heat sterilization, employing a combination of convection, conduction, and radiation mechanisms. Scientifically, the process begins with the heating elements warming the air within the chamber. To ensure uniform heat distribution, fans circulate this heated air, ensuring all surfaces of the samples or items inside are uniformly exposed to the elevated temperatures.

7) Pharmaceutical dryers[16]

Dryers are used to remove liquids or moisture from bulk solids, powders, parts, continuous sheets or other liquids by evaporation or sublimation. Such as

- Vacuum tray dryer – It is used mainly for drying of high grade, temperature and oxygen sensitive products. It is highly suitable for drying hygroscopic substances, which are dried to very low residual moisture, content level.
- Rotatory dryer – These dryers feed materials in to thumbling or rotating drum or tumbler. The drum is heated or heated air is fed in to unit. The internal surface of the drum may have baffles or louvers to channel the hot air or cascade the material.

8) Tablet making machines[17]

The tablet press is a high speed mechanical device. It compresses the ingredients into the required tablet shape with extreme precision. A tablet is formed by the combined pressing action of two punches and a die. Types of punching machines -

- Single punch machine[18] – It employs a single tooling station that is a die and a pair of upper and lower punches. In this the compaction force on the fill material is exerted by only the upper punch while the lower punch is immovable such as action equivalent to hammering motion.
- Rotatory tablet machine – It is also called as multi station tablet press. It is termed because the head of the machine that holds the upper punches, dies and lower punches in place rotates.

9) Tablet coating machine[19]

It is an equipment that coats the external surface of a tablet using a thin film of coating material. For the tablet which is to be coated they are placed in a closed drum which is made to rotate continuously in an orbital manner under the influence of a streamlined plate. During the orbital motion of the tablets, the coating medium sprays automatically in a rotational manner in order to avoid excess coating on the tablets.

10) Granulators[20]

Used in mixing agitation, and shear mixing, used in pharmaceuticals to make granules. The components are highly responsible for the wet granulation process.

The impeller in the machine is responsible for uniformly mixing wet granules, and the chopper helps in breaking or reducing particle size at this stage they work on a low speed. Then after the formation of wet mass, they are operated at a high speed to make the desired granule size.

Granulation is the process in which primary powder particles are made to adhere to form larger, multiparticle entities called granules. After granulation the granules will either be packed or they may be mixed with other excipients prior to tablet compaction or capsule filling.

11) Blenders[21]

Play a significant role in mixing ingredients in pharmaceuticals. Different types are available in blenders such as octagonal blenders, V- type blender, double cone blender, vertical blender, mass blender.

12) Strip packing machine[22]

Automatic high speed packing machine with a capacity up to 2500 tablets per minute. In this machine wide range of products can be packed automatically / semi-automatically. The product is fed through hopper and feeding device flows to the heat sealing roller cavities, the desired laminated foils from the two rollers is drawn on the sealing rollers which packs and seals the product continuously. The sealed strip passes through the vertical and horizontal cutters to get desired strip sizes.

DISCUSSION

Yantras are mentioned in Rasa Tarangini, which shows most practical applicability. Yantras are used in different pharmaceutical procedures, Yantras are named based on their shape, material used for their formation and the procedures for those they are used.

Previously for heating purpose of any procedures the chullika or angara kostis were used in modern methods gas stove, electric heater, hot plates, steam are been used.

In ancient methods for extraction of swarasa, kalka, churna the khalva yantra / putapaka methods were used for easy way of preparation these are replaced with the grinders, mixers, juice expellers.

For vastragalana i.e. for filtration purpose clothes were being used but recently instead of clothes the sieves were being used which are in various sizes named according to the numbers, are easy to handle and filtrate the products of desired size particles.

For arka preparation or to extract the active constituents of any plants or mineral tiryak patana yantras were used in advanced techniques extracted by different types of distillation procedures.

For drying of the finished products or the wet products, these dried under shade or hot sun now a day's ovens or different types of dryers are used.

In order to produce huge number of tablets or capsules of different medicines manual method takes longer duration to help with the production now a days the tablet making machine i.e., single punch, multiple punch are being used.

For sandhana or fermentation previously done with mritpatra sharava vastra recent methods for this the drums are been used i.e., wooden drums syntax drums, cement tanks, steel vessels.

CONCLUSION

Rasashastra approaches more practical than theoretical, for successful accomplishment of the procedures, importance of the Yantras / equipment's are most. These are significantly important in Parada Ashtasamskar and Rasaushadhi preparation. Before internal administration of these herbomineral preparations, metals and minerals has to go under different procedures i.e. shodhan, marana, jarana etc. Without these procedures could not be perform. Thus in order to growing technologies the advancement in the equipment's are to be adopted in day to day preparations of any pharmaceutical products. Standardization of these traditional Yantra is need of the time.

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