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Critical review on correlation between ancient and modern equipment for churnakalpana

Acknowledgement

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Abstract

Churnakalpana is the fine powder of a completely dry drug filtered through a clean cloth, suksmakalka, suskapisti ,raja and ksoda are the synonymus words used for churna in classics,thoughchurnakalpana is a prominent preparation in pharmaceutical world of Ayurveda,it is considered as an upakalpana of kalka kalpana In ancient time, there were few yantras to prepare these churna but in recent era, these are modified to fulfil the same purposes. This article deals with the review of instruments used in ancient & present time which are used for the preparation of churnakalpana

Keywords-ChurnaKalpana,Yantra ,Instruments

Scope of future

- To conduct pharmaceutical study by comparing the efficacy of medicines which is prepared by ancient and modern technologies
- Research for inventing new technology for easy process

Research outcome

The main benefit of advanced technology is that the time consumption is lesser when compared to ancient equipments,so along with saving time and we can face market demand effectively by producing bulk quantity of products within short duration of time by adopting modern technology.

Introduction

'Rasashastra and BhaishajyaKalpana' is the important branch of Ayurveda which deals with awareness of drugs including identification, procurement, processing, preparation and application.1,2,3 In the past few years this branch have achieved advancement due to availability of reliable tools and machine, thus making the pharmacy of Ayurveda more and more efficient. Due to advance technology, Ayurveda pharmacy improved and advanced a lot and has also become efficient. In Ayurveda for conducting & operating different Kalpanas (preparations) different Yantras

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(instruments) are used 4,5 .These Yantras are considered as tools, instruments,equipments, machines in modern era. Size reduction of different material is known as milling and procedure of size reduction is generally termed as comminution and grinding. Except these for conducting, cutting, chopping, crushing, grinding, milling, micronizing and trituration, many Yantras are specified. Moreover the use of disintegrator, grinder, pulverizer, mixer, end runner, edge runner has made the manufacturing more efficient, more reliable, increased the production . This article aims to discuss the instruments used in ancient times and present era for the process of churnakalpana.

Discussion-

Ancient equipments

Ancient era Khalvayantra6,7-It is bluish or blackish, smooth, heavy and strong stone which is used for Khalva or mortar. Its mortar made with the above stone having the measurement of 24"×4"×16" lbh, the most ideal and is used various purifying procedure. The length of the gharshani (pestle) should be 12" lbh. KhalvaYantra are of 3 types8 -Semi lunar shaped 9,10 circular shaped 11,12tapta khalva.13

- Some are lunar shaped 10" height, 16" length, 7" depth, 16"×7"×10" lbh measured semi lunar shaped mortar is ideal to pound 5 pales. Its pestle should be 12" length, made with the same time.
- 12" diameter and 4" depth measured circular mortar with a hard of pestle in the second variety.
- 9" length and 6"depth mortar with 8" lengthy pestle in the third variety and is known as Tapthakhalva.

KhalvaYantras are used for mardana process.14

- Ancient era ulukhalayantra :15 It is also known as Emmamdasta. It is made up of iron and consists of two parts mortar and pestle.
- Mortar-Measurements having 16" height 10" width and 13" depth is essential for the preparation of mortar.
- Pestle-The length must be 20". It is use to pound dry herbal drugs or mineral drugs such as Suvarnmakashik, tagara, and loha etc.

Ancient chalini16–Sieves are commonly employed for particle size separation after comminution. Sieves are usually prepared using a metal or plastic frame, and wire or a fabric mesh. In Ayurvedic texts, three types of sieves are mentioned. It is used for uniform size separation of a powder.

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Modern eqiupments for churnakalpana

Hammer mill

Hammer mill consists of a series of hammers hinged on a central shaft and enclosed within a rigid metal case.The size reduction is produced by impact .The materials to be milled are struck by these rectangular pieces of hardened steel which rotates at high speed inside the chamber.These radically swinging hammers moves at a high angular velocity causing brittle fracture of the feed material.

The material is cushed or shattered by the repeated hammers impacts,collisions with the walls of the grinding chamber as well as particle on particles impacts. a screen is fitted at the bottom of the mill,which retains coarse materials while allowing the properly sized materials pass as finished product.

Uses –it is used to mill dry materials,brittle material is best fractured by impact from blunt hammers, fibrous material is best reduced in size by cutting edges.

Advantages –

- Produces relatively numerous size distributions with of fines due to self classification
- It has high reduction ratio and high capacity wheather used for primary ,secondary or tertiary grinding
- It is capable of grinding many different types of material
- It occupies lesser space,easy to clean and maintain

Ball mill

- Ball mill works on the principle of impact and attriction.this mill is also called as jar mill
- It consists of a cylindrical container or jar made up of steel or porcelain
- The length of the cylinder is slightly greater than its diameter which is partially filled with balls made from the same material as that of cylindrical vessel , these balls act as grinding medium.
- The cylindrical vessel is mounted on a metallic frame and rotates horizontally either manually and mechanically .the upper side of the vessel is fitted with a tightly closed lid through which the material is introduced.
- The material to be ground is put into the mill through the lid.the mill is rotated at a slow speed until the product of desired size is produced.
- Rotation of the mill at high speed is avoided because at the high speed the balls are held against the mill casing the centrifugal force and revolve with the mill and will not fall on the drug when they reach at the top position.after an appropriate time when the material has been reduced it is taken out from the vessel and passed through a suitable sieve to get the powder of desired particle size.

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- The particle size of the material is reduced by rolling,sliding and tumbling of the balls on the material to be reduced.
- The balls used are 2 to 5cm in diameter.the smaller size balls are more efficient because they produce fine particles.

Advantages –

- they are economical and simple to operate
- A wide variety of material can be ground with it
- They are easy to clean when compared compared to other mills
- They can be easily sterilized therefore can be used for grinding the materials to be used in parentral and ophthalmic preparations
- They can be useful for both purposes that is dry and wet grinding

Disintegrator machine:

It works on the principal of impact and grinding it used for powdering of drugs especially coarse powder. About the mill-The disintegrator consist of drum shaped chamber made of steel. In the chamber, there are four steel beater foxed to a disc through which passes a shaft which rotate at a speed up to 5000 to 7000 r.p.m. the lower part of chamber is fitted with desired number of sieves. The drug to be comminuted is fed into the chamber through the feed where it is broken by the direct flow of the beaters and by impact of material which is thrown with a great force against the surface of chamber. Nowadays disintegrators have become very popular because they can be used for reducing the particle size of different kind of materials.

Uses-powdering drugs especially coarse powder (kwathchoorna).

Advantages-Can be used for powdering crude vegetable drugs.

I. They can be used for powdering very hard drugs.

II. They can be used for mixing the ointment and for mixing powder ingredients.

End runner mill:

It is a modified form of pestle and mortar. Principle-It makes on the principle of the crushing and shearing. Structure-It consists of a mortar made of steel or granite. A dumble shaped heavy pestle is mounted eccentrically in the mortar through a hinged joint. The mortar is rotated by a mortar. The pestle rotates itself by friction. Working- Fall in the mortar due to the grinding action i.e. crushing and shearing are produces scrappers are attack to pestle which ensure that material is not constantly removed. The material is crushed and rubbed between the pestle and rotating mortar. At the end of grinding the pestle is raised to facilitate emptying and cleansing of mortar.

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Advantages- Reduces the particle size even of hard material, large quantity of material can be processed for reduction; wet grinding is also possible in the mill.

Edge runner mill:

This mill works on the principle of crushing and friction.the edge runner mill is also known as chaser mill because two heavy wheels madeup of steel or granite are mounted vertically on a horizontal shaft which are made to resolve or chase each other on a steel or granite base.the stones may vary from 0.5 to 2.5 meter in diameter.the large size rollers may weigh up to six tones ,usually the wheels are rotated but sometimes the base determines the particle size of the material ,hence the fineness of the particle can be increased or decreased by adjusting the height.The material to be ground is put on the base of the mill and is kept in the path of the runners by scrappers.the particle size is reduced due to crushing by the weight of rollers but is more due to the friction between the rollers and the bed stone .after grinding the material for a specificified time it is taken out of the mill ,passes through a suitable sieve and the coarse material is obtained after sieving is again put in the mill for regrinding or it may be mixed with the material to be ground in the next batch.

Uses-edge runner mill is used for grinding tough materials to fine powder.it is still used for plant based material

Cutter mill:

Now days, cutter mills are used for the perfect size reduction of material.

Working- In this the stationary knives are mounted in casing of machine and rotating knives attached to a rotator which rotate at a high speed. The upper part is attached with a feed and at lower part of machine a screen of desired size is attach. The material to be reduced in size is put in the feed and reduced material is collected from screen. This method is used to obtain a coarse degree of size reduction of soft materials such as roots and peels before its extraction.

Advantages-It has high speed reduction and cutting can be done in large quantity due to which man effort is reduce in efficient time. The cutter mill is fitted with two types of knives17 Stationary and rotating.

Sieve shaker:

A feature of modern pharmaceutical industry. Numerous methods have been developed for sifting powders and determining their practical size. Sieving is undoubtedly the most common process, being applicable to practically all powders from about 40 mm upwards. The powder under test is passed through a number of sieves of increasingly smaller mesh size and the weight remaining on each sieve is measured. For rapid sieving, a mechanical shaker is used that imparts gyratory and vibratory movement to spread material over whole of mess. Size-The nest of sieves is cradled loosely a

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slightly inclined position in crook of arm and tapped at rate of approximately 150 time/min after about 50 taps, the sieves are put into a horizontal position.

Advantage- Sieve shakers are used for separation and size determination of particles.

Materials and method

The literature search was based on online published, authentic databases, research journals like springer, scopus, pubmedembase and google scholar

Conclusion

In the Vedic period there were various tools and instruments used for preparing various medicines and the advanced equipments or instruments are actually their advanced versions. The concept of these machines has helped a lot in establishing ayurvedicpharmaceutics to another level. Due to this, rasashastra and bhaishajyakalpanais growing rapidly and helping the Indian pharmacy by providing them efficiency. No doubt that tools & instrument of older era has given the concept and ideas and this has been implied in our advanced instruments . They reduce human effort, are time efficient and product can be easily available too.

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