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KINETIC OF CHEMISTRY BHAVANA

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ABSTRACT

Rasa Shastra is the Ayurvedic chemistry, the science of life which deals with mercury and its processing. The induction of new physical and chemical properties to the drug by this unique technology can be investigated scientifically through analytical, Biochemical, pharmacological and Toxicological studies which may contributes to standardise the Rasa formulations in global market.This paper deals with the concept of Bhavana which plays very important role in the preparation of Ayurvedic formulationsThe process by which metals/minerals are powdered and triturated with suitable liquids and dried is called Bhavana.

KEYWORDS: Bhavana, Rasa formulations.

INTRODUCTION

- In Ayurvedic system of medicine, metal/mineral-based formulations are being used since time immemorial.
- Our ancient scholars, who encouraged the use of metals and minerals for the treatment purpose were also aware of their toxicity in general.
- None of them has advised the use of drugs in the crude form internally. Moreover in crude form these drugs will not absorb so easily.
- Considering these factors, our ancestors have described certain processes, which help to remove impurities, toxicities from crude materials and convert them into more bioassimilable state.
- Bhavana is one among such process which has the above said property.

Bhavana literally means….

- Saturation of any powder with fluid
- Effecting
- Promoting
- act of producing
- Infusion

- Soaking
- Flavoring

SAMSKARA

Definition

To change the qualities of a Dravya is known as Samskara.

Types

1. Toya sannikarsa
2. Agni sannikarsa
3. Toyagnisannikarsa
4. Shoucha
5. Manthana
6. Desa
7. Kala
8. Vasana
9. Bhavana
10. Kalaprakarsa
11. Bhajana

DEFINITION OF BHAVANA

The process by which metals/minerals are powdered and triturated with suitable liquids and dried is called bhavana.

DIMENTIONS OF BHAVANA

- Bhavana done in day time.
- Bhavana done in bright sunlight.
- Bhavana done in the night time.
- Soaking (nivasana) done in the night and mardana done/liquid is removed on the next day.
- Soaking (nivasana) and then drying in the sunlight. Eg:- Shilajatu shodhana in Triphalakwatha.

Criteria's to be observed:-

- Wetting
- Mire like consistency
- Immersion

- Becoming homogeneous mixture

Lakshana of Samyak Bhavana

Bhavita Dravya on grinding converted into sticky paste form and is soft in nature. Any Bhavita Dravya which shows such Lakshana is termed as Subhavita Dravya.

DURBHAVITA LAKSHANA

Bhavita Dravya on grinding suddenly turns into powder form, rough in touch and not good look in appearance. This is Durbhavita Lakshana of Bhavita Dravya.

UTILITY OF BHAVANA

- As samskara
- In shodhana
- As poorvakarma for marana
- In Nirvisheekarana
- In satwapatana
- In binding

BENIFITS of bhavanam

- Makes Rasoushadhis absolutely non-toxic
- Convert them into easily absorbable form through the intestinal mucosa
- Enhance the therapeutic efficacy so that these could be administered in small dose.
- To enhance drug palatablity.
- To widen the therapeutic utility
- Reduction of hardness
- Particle size redution
- Attribution of the properties of bhavanadravya to bhavyadravya.
- Poorva karma for marana.

FACTORS TO BE CONSIDERED….

- Grinding should be done continuously for specific period.
- Liquid media must be mixed well.
- After grinding, the material should be allowed for complete dryness.
- The Mortar and Pestle should be inert, must not react with the material.
- Wherever repetition of Bhavana is mentioned, there proceeding Bhavana is given after complete dryning of the previous one.

Role of liquid media in the pharmaceutical process of Bhavana

- Liquid media facilitates in **easy and smooth grinding**

- The wet grinding **eliminates hazards of dust**.
- It is also found interestingly in practice that the **finer particle size can be achieved** by wet grinding than by dry grinding.
- Liquid media acts as a **binding agent** also. In case of *Kharaliya Rasayana* liquid media helps in **preparation of pills**.

Role of liquid media in drug action

- It is noted that the liquid media is selected according to the therapeutic application of the drug, particularly its application in different system.
- The liquid media also serves as source of trace elements:-Every liquid media possesses some inorganic material. In Bhasma preparation, these inorganic contents are transferred to Bhasma and acts as trace elements, useful for our body.
- Particular media is mentioned for levitation of specific material indicates some basic relation between the particular media and specific material.

Chemical Kinetics Or Kinetic Chemistry

- Involves the study of the rate of a chemical process.
- Gives information about how the reaction occur, that is, the reaction mechanism (exactly *how* the reaction occurs).
- So in general Determining the reaction mechanism is the overall goal of C.K.
- In a nutshell it's a scientific analysis of chemical reactions.

Kinetic chemistry of bhavana is difficult to interpret. Why?

- A rasa dravya may be a single entity, but bhavanadravya is a **complex mixture** of various chemicals.

Combined actions of several ingredients.

- Many of the **active chemicals** both in herbal as well as mineral compounds are still unknown.
- So specific action is difficult to assess.

WHETHER BHAVANA DRAVYA IS A MERE LIQUID?

The liquids used for the process of bhavanacontain one or many of the following qualities or substances:

- Weak / Strong acids
- Weak / Strong bases
- Enzymes

- Solvents
- Inorganic contents
- Herbo-mineral entities
- Specific Prabhava

UNIQUENESS OF BHAVANA

- Over all chemical effects of any of the purification methods including Bhavana is done to make the substances ***"IMPURE"*** in its truest sense! And still procedures are called as purification methods.
- When the substance of inorganic nature enters in to human body, mostly it is not accepted. It is either rejected totally in the form of severe vomiting or loose motion or it is absorbed & detoxified in Liver or other tissue.
- All our body organs are made up of organic compounds hence the drug if they are in organic form will be more easier to digest and more acceptable to the body.
- Metals and minerals must be converted into organic materials
- This can not be achieved if 100% chemically pure substances are used in drug production.
- Most of the other purificatory procedures like nirvapa, swedana, dalanaetc are done mainly to convert the surface particles into organic material.
- But bhavana is the only method in which each and every molecule has given utmost care.

Griffith theory in particle size reduction

- The particle size reduction during bhavana process may be explained by **Griffith theory.**
- According to this theory, all solids contain flaws and microscopic cracks.
- A flaw is any structural weakness that may develop into a crack under strain like pressure applied during bhavana.
- The weakest flaw in a particle determines its fracture strength.
- Usually the surfaces of particles are irregular. The applied force in the form of pressure is initially taken on high portion of the surface.
- As a result, high stress may be set up locally in the particles. The bond at this place becomes weak, which may be responsible for flaws.
- The particle with the weakest flaw fractures most easily and produced largest possible pieces.
- In the next step, another weakest flaw fractures. By this way particle size is reduced

Surface Phenomena/Attrition in Particle Size Reduction

- In Bhavana process, the materials with liquid media are rubbed between the surface of pestle and mortar.
- This process involves breakdown of the material by rubbing action between two surfaces, i.e**.** surface phenomena, it is also called as attrition.
- When stress in the form attrition is applied, the particle surfaces chip and produce small particles.
- Bhavana is given by grinding with some liquid media, so it may be considered as wet grinding and it is observed interestingly that finer size of particles can be achieved by wet grinding than dry grinding.

IMPORTANCE OF PARTICLE SIZE REDUCTION

Mixing: - Fine particles give uniform mixing with a homogeneous mass. This also assures the uniform dose when there are various constituents in a formulation.Some volatile principles may get evaporated during the mardana process. This is due to the more exposed surface area of the drug and also the increased temperature during the grinding process.

INCREASES SURFACE AREA

Particle size and surface area of a solid drug are inversely related to each other. Smaller the drug particle greater the surface area. This increased surface area, exposes the drug particles more to the bhavana media which enhances the rate of reaction. Large surface area exposed to the atmosphere helps in oxidation of the active constituent of the drug by the atmospheric oxygen.

IMPORTANCE OF SURFACE AREA

As Particle size decreases and surface area increases, particles become random in position. When it comes in contact with liquid media, each molecule gets surrounded by liquid. By this impregnations of constituents of bhavanaDravya into bhavyadravya becomes easier.

SURFACE AREA INCREASES COLLISION

- According to theory of collision, reactions can only occur only when reacting particles collide with each other.
- Decreasing the size of particles increases the surface area. If there is a larger surface available for particles to collide then will be more collisions. Therefore the rate of reaction is increased.
- In a chemical reaction, bonds are broken and new bonds are formed. By the formation of such new bonds, property of the material will be changed.

Effect on absorption

- Sparingly soluble drugs are absorbed more rapidly when they are administered in fine powdered form.
- Particle size is one of the factors which will affect dissolution and absorption of drug.
- Larger the surface area, higher the dissolution rate and effective absorption. (Since the surface area increases with decreasing particle size)

ROLE OF SUNLIGHT IN BHAVANA

- All the metals have free electrons in their outer most shells.
- When light falls on the surface these free electrons absorb photons(which is a component of the light radiation) from light rays and start oscillating.
- During this oscillation they emit a radiation of frequency equivalent to that of incident light. This is nothing but the reflection.
- As the light is reflected the surface acquires a bright shining appearance.

CONCLUSION

Biological changes:

- Reduction in the particle size helps in absorption of the materials and increase bioavailability.
- Induction of trace elements helps in fulfilling the body requirement of trace elements and also acts in many physiological processes.
- Formation of desired compound during *Bhavana process increases the* therapeutic efficacy of the material.
- Organic components of the liquid media are transferred to the material to make it organo-metallic or organo-mineral compounds, which are favourable to the body.

IN A NUTSHELL…….

- Bhavana does
- Mala Vichchedana
- Dravya Dosha Nivarana
- Gunantaradhana

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