### SUPPOSITORIES AND PESSARIES

- Suppositories are solid dosage forms intended for insertion into body orifices where they melt, soften, ordissolve and exert localized orsystemic effects.
- Dosage form characteristics:
- **a.** <u>Rectal suppositories</u> for adults weigh 2 gm andare torpedo shape. Children's suppositories weigh about 1 gm.
- Vaginal suppositories or Pessaries weigh about 3-5gm and are molded in globular or oviform shape or compressed on a tablet press into conical.<u>Urethral suppositories</u> called bougies are pencil shape. Those intended for males weigh 4 gm eachand are 100-150 mm long.
  those for females are 2 gm each and 60-75 mm in length.



C. <u>Nasal suppositories:</u> called nasal bougies or buginaria meant for introduction in to nasal cavity.

- > They are prepared with glycerogelatin base.
- They weigh about 1 gm and length 9–10 cm.

# d. Ear cones:

- Aurinaria and meant for introduction into ear.
- Rarely used
- > Theobroma oil is used as base.
- Prepared in urethral bougies mould and cutaccording to size.

#### **ADVANTAGES:**

- \_ Can exert local effect on rectal mucosa.
- \_ Used to promote evacuation of bowel.
- \_ Avoid any gastrointestinal irritation.
- \_ Can be used in unconscious patients (e.g. duringfitting).

- \_ Can be used for systemic absorption of drugs and avoid first-pass metabolism.
- Babies or old people who cannot swallow oralmedication.
- Post operative people who cannot be administeredoral medication.
- People suffering from severe nausea or vomiting.

#### DISADVANTAGES OF SUPPOSITORIES:

- The problem of patient acceptability.
- Suppositories are not suitable for patients sufferingfrom diarrhea.
- In some cases the total amount of the drug mustbe given will be either too irritating or in greater amount than reasonably can be placed into suppository.





- Pessaries are a type of suppository intended forvaginal use.
- The larger size moulds are usually used in thepreparation of pessaries such as 4 g and 8 g moulds.
- Pessaries are used almost exclusively for local medication, the exception being prostaglandinpessaries that do exert a systemic effect.



#### British Pharmacopoeia (BP) definition:

"Pessaries are solid, single-dose preparations. They have various shapes, usually ovoid, with a volume and consistency suitable for insertion into the vagina. They contain one or more active substances dispersed or dissolved in a suitable bases that may be soluble or dispersible in water or may melt at body temperature. Excipients such as diluents, adsorbents, surface-active agents, lubricants, antimicrobial preservatives and colouring matter, authorised by the competent

authority, may be added, if necessary."

Common ingredients for inclusion in pessaries for local action include:

- antiseptics
- contraceptive agents
- local anaesthetics
- various therapeutic agents to treat trichomonal,bacterial and monilial infections.

#### **IDEAL SUPPOSITORY BASE:**

- 1. Melts at body temperature or dissolves in bodyfluids.
- 2. Non-toxic and non-irritant.
- 3. Compatible with any medicament.
- 4. Releases any medicament readily.
- 5. Easily moulded and removed from the mould.
- 6. Stable to heating above the melting point.



I <u>FATTY BASES</u>: designed to melt at bodytemperature.

- 1 Theobroma oil (Cocoa butter)
- It is a yellowish-white solid with an odour of chocolate and is a mixture of glyceryl esters of different unsaturated fatty acids.

#### Advantages:

- a- A melting range of 30 36°C (solid at roomtemperature but melts in the body).
- **b** Readily melted on warming, rapid setting oncooling.

- **C** Miscible with many ingredients.
- d– Non-irritating.

#### <u>Disadvantages:</u>

- <u>a– Polymorphism</u>:
- When melted and cooled it solidifies in different crystalline forms, depending on the temperature ofmelting, rate of cooling and the size of the mass.
- If melted at not more than 36°C and slowly cooled it forms stable beta crystals with normal melting point.
- If over-heated then cooled it produce unstable gammacrystals which melt at about 15°C or alpha crystals melting at 20°C.

Cocoa butter must be slowly melted over a warm waterbath to avoid the formation of the unstable crystalline form.

#### **b**- Adherence to the mould:

- c- Softening point too low ross. dimates.
- d- Melting point reduced by soluble ingredients: Phenol and chloral hydrate have a tendency to lowerthe melting point of cocoa butter.- So, solidifying agents like beeswax (4%) may be incorporated to compensate for the softening effect of the added substance.
- e- Rancidity on storage:
- f- **Poor water-absorbing ability**: Improved by theaddition of emulsifying agents.

#### SYNTHETIC HARD FAT:

For example: Suppocire, witepsol.

#### Advantages:

- a- Their solidifying points are unaffected byoverheating.
- b- They have good resistance to oxidation becauseof the lower content of unsaturated fatty acids.
- c- The difference between melting and setting points is small. Hence they set quickly, the risk of sedimentation of suspended ingredients is low.

d-They are marketed in a series of grades withdifferent melting point ranges, which can be chosen to suit particular products and climaticcondition.

- e-They contain a proportion of w/o emulsifyingagents, and therefore, their water-absorbing capacities are good.
- f- No mould lubricant is necessary because theycontract significantly on cooling.

Disadvantages:

- a- Brittle if cooled rapidly, avoid refrigeration duringpreparation.
- b- The melted fats are less viscous than theobromaoil. As a result greater risk of drug particles to sediment during preparation lack of uniform drugdistribution give localized irritancy.

- II Water-soluble and water-miscible bases:
- 1- Glycero-gelatin:



DISADVANTAGES:

- a- A physiological effect: osmosis occurs during dissolving in the mucous secretions of the rectum, producing a laxative effect.
- b- Can cause rectal irritation due to small amount ofliquid present.
- c- Unpredictable solution time.
- d- Hygroscopic: So, they should be packaged in tight containers and also have dehydrating effects on the rectal and vaginal mucosa leading to irritation.
- e- Microbial contamination likely.



## 2 – <u>Macrogols (polyethylene glycols):</u>

- Polyethylene glycols are polymers of ethylene oxide andwater, prepared to various chain lengths, molecular weights, and physical states.
- The numerical designations refer to the averagemolecular weights of each of the polymers.
- Polyethylene glycols (PEGs) having average molecularweights of 300, 400, and 600 are clear, colorless liquids, while those with molecular weights of 600-1000 are semisolids.
- Those having average molecular weights of greater than1000 are wax-like, white solids with the hardness increasing with an increase in the molecular weight.
  - These polyethylene glycols can be blendedtogether to
- produce suppository bases with varying: meltingpoints, dissolution rates and physical characteristics.
- Drug release depends on the base dissolvingrather than melting.
- The melting point is often around 50°C.
- Higher proportions of high molecular weightpolymers
- produce preparations which release the drug slowlyand are also brittle.

#### Preparation of suppositories:

- Suppositories are prepared by four methods: I Hand moulding:
- -Hand molding is useful when we are preparing asmall number of suppositories:

- **1** The drug is made into a fine powder.
- 2. It is incorporated into the suppository base bykneading with it or by trituration in a mortar.
- $\mathbf{3}$ . The kneaded mass is rolled between fingers intorod shaped units.
- **4.** The rods are cut into pieces.
  - II Compression molding:
  - 1. The cold mass of the base containing the drug is compressed into suppositories usinga hand operated machine.
- \*\*Advantages:
- It is a simple method.
- $\mathbf{2}$ . It gives suppositories that are more elegant thanhand moulded suppositories.
- $\mathbf{3}$ . In this method sedimentation of solids in the baseis prevented.
- Suitable for heat labile medicaments.

- \*\*Disadvantages:
- 1.Air entrapment may take place.
- 2. This air may cause weight variation.
- 3. The drug and/or the base may be oxidized by thisair.
  - III Pour moulding:
  - Using a supp. mould which is made of metal or plastic. Traditional metal moulds are in two halveswhich are clamped together with a screw.
    - Steps:
  - The base is melted and precautions are taken notto overheat it.
  - 2. The drug is incorporated in it.
  - **3.** The molten liquid mass is poured into chilled(lubricated if cocoa butter or glycrogelatin isthe base)molds.

**4.** After solidification, the cone shaped suppositories are removed from the mould.

5. Lubricating the cavities of the mould is helpful inproducing elegant suppositories and free

from surface depression.

- The lubricant must be different in nature from thesuppository base, otherwise it will be become absorbed and will fail to provide a buffer film between the mass &the metal.
- The water soluble lubricant is useful for fatty baseswhile the oily lubricant is useful for water soluble bases.
- The lubricant should be applied on a pledget of gauze or with fairly stiff brush.

# LUBRICANTS FOR USE WITH SUPPOSITORY BASES:



- Theobroma oil
- Glycerol– gelatin base

Lubricant

- Soap spirit
- liquid paraffin

No lubricant required

- Synthetic fats
- Macrogols

- IV Automatic Moulding machine:
- All the operations in pour moulding are done byautomatic machines. Using this machine, up to about 10,000 suppositories per hour can be produced.
- Packaging and storage:
- -Suppositories are usually packed in tin oraluminium, paper or plastic.
- -Poorly packed suppositories may give rise tostaining, breakage or deformation by melting.
- -Both cocoa butter and glycerinated gelatin suppositories stored preferably in a refrigerator.
- - Polyethylene glycol suppositories stored at usualroom temperature without the requirement of refrigeration.



