

SOLID DOSAGE FORM

Mr. Ravikumar R Patil

Dr. Shivajirao Kadam College of Pharmacy

Introduction

POWDER

- Powders are the mixture of finely divided drug or chemicals in dry form.
- They are used for internally & externally.
- They are available in crystalline or amorphous form.
- There is a relationship between particle size of powder & dissolution, absorption & therapeutic effect of drug.

Advantages of Powders

- Powders are more stable than liquid dosage form.
- The chance of incompatibility are less as compared to liquid dosage form.
- The onset of action of powdered drug is rapid as compared to other solid dosage form e.g. tablet, capsules. Due to smaller particle size of powder, it get dissolved easily in body fluids.
- Larger qty. of powdered drugs can be administered to the patient orally by dissolving or mixing the powder in the suitable liquid.
- Small children or elderly patient can easily take the powdered drug as such or dispersed in water or any other liquid.
- Powders are more economical as compared with other dosage form because not required any special machinery or technique.
- Powders are more easy to carry than the liquid dosage form.

Disadvantages of Powders

- Drugs having bitter, nauseous & unpleasant taste cannot be dispensed in powdered form.
- Deliquescent & hygroscopic drugs cannot be dispensed in powder form.
- Drugs which get affected by atmospheric conditions are not suitable for dispensing in powder forms.
- The dispensing of powder is a time consuming.

Classification of Powders

1. Bulk powder for internal use.
2. Bulk powder for external use.
3. Simple & Compound powder for internal use.
4. Powders enclosed in cachets & capsules.
5. Compressed powders (Tablets)

Bulk Powder for Internal Use

- When accuracy of dosage form is not required or is not important at that time powders are dispensed in bulk form.
- Bulk powder contains several doses of powder.
- They are supplied in wide-mouthed containers that permits easy removal of a spoonful powder.
- The non potent substances which are supplied in bulk are antacid & laxative etc.
- E.g. rhubarb powder

Bulk Powder for External Use

- Bulk powder for external use are non potent substance.
- These powders are supplied in cardboard, glass or plastic containers, which are often designed for the specific method of application.
- The dusting powders are supplied in perforated or sifter top containers.
- The bulk powders which are commonly used for external applications are follows:
 - Dusting Powders
 - Insufflations
 - Snuffs
 - Dentifrices



Bulk Powder for External Use

- **Dusting Powders:**
 - These are used for external application on the skin & generally applied in very fine state to avoid local irritation.
 - Therefore, dusting powder should be passed through sieve no. 80 or 120 to enhance their effectiveness.
 - Dusting powders are 2 types: i. Medical ii. Surgical
 - Medical & surgical dusting powders are free from pathogenic microorganism.
 - Medical & Surgical dusting powders before use must be sterilised by dry heat method at 160°C for 2 hrs.
 - Surgical dusting powders are used in body cavities & also used on burn case & umbilical cord of infants.
 - Whereas, medical dusting powders are generally use on superficial skin condition.

Bulk Powder for External Use

• Cont..

- In the preparation of dusting powder the talc or kaolin, starch are used commonly because these are chemically inert.
- But, such ingredients are readily contaminated with pathogenic bacteria so, these must be sterilised before their use by dry heat sterilisation method.
- The dusting powders are dispensed in sifter or aerosol containers.
- Dusting powders are generally non- toxic but inhalation of its fine powdered ingredients by infants may lead to pulmonary inflammation. So proper care should be taken while handling.
- **Use : Antiseptic, Astringent, Absorbent, Antiperspirant**

Bulk Powder for External Use

- E.g of Dusting powder

Rx,

Purified talc, sterilised	50 gm
Starch powder	25 gm
Zinc oxide powder	20 gm
Salicylic acid powder	5 gm

Procedure: weigh accurately all the powders & mix them ascending order of their weight. Pass the mixed powder through sieve no 85 or 120. after sieving mix them lightly & Transfer into sifter top container & protect it from atmospheric contamination.

Direction: Applied on the affected part two or three times a day.

Use: Zinc oxide use for astringent & antiseptic & salicylic acid used for antiseptic & fungicidal.

Bulk Powder for External Use

- **Insufflations:**

- These are medicated dusting powder.
- they are introduced into body cavities such as, nose, throat, ears & vagina with the help of an apparatus “Insufflator”.
- Nowadays, the insufflations are available in the form of pressure aerosols & these aerosols used for potent drugs.
- Insufflations are used to produce a local effect in the treatment of ear, nose, throat infection with antibiotics or to produce a systemic effect from a drug that is destroyed in the gut.



Bulk Powder for External Use

- **Snuffs:**

- These are finely divided solid dosage form of medicament.

- Which are inhaled into nostrils for antiseptic, bronchodilator & decongestion action.

- Snuffs are dispensed in flat metal boxes or glass container with hinged lid.



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Bulk Powder for External Use

- **Dentifrices:**

- These are applied on tooth surface with help of brush.
- In that contains suitable detergent or soap, some abrasive substance & suitable flavoring agents are involved.
- Abrasive agents such as calcium sulphate, calcium carbonate, sodium carbonate & sodium chloride are use in fine powder.
- E.g.

Rx,

Hard soap powder	50 gm
Calcium carbonate powder	935 gm
Saccharin sodium	2 gm
Peppermint oil	4 ml
Cinnamon oil	2 ml
Methyl salicylate	8 ml

Simple & Compound Powders for Internal Use

- In this form of powder, each individual dose is enclosed in paper.
- The number of ingredient is one i.e. simple powder while more than one i.e. compound powder.
- The minimum quantity of each powder should not be less than 100 mg for it can be handled conveniently by patient & can be weighed accurately.

Simple & Compound Powders for Internal Use

• SIMPLE POWDER:

- In simple powder contains only one ingredient either in crystalline form or amorphous form.
- If powder present in crystalline form then it is reduced to fine powder, weighed the powder & divided into number of doses & wrapped as individual dose.
- E.g. Dispensed six powders of Aspirin each powder contains 300 mg of aspirin
- Rx,
Aspirin 300 mg

Procedure: powder the aspirin & weigh the required quantity of aspirin. Weigh 300 mg of aspirin for each powder & wrap each powder in individual powder paper.

Direction: One powder to be taken after every eight hours.

Simple & Compound Powders for Internal Use

• COMPOUND POWDERS:

- Compound powders contains two or more than two substances which are mixed together.
- Then divided into desired number of individual doses.
- Then dispensed into each powder paper.
- E.g Dispense eight powder of A.P.C each powder contains 500mg of A.P.C
- Rx,

Aspirin	300 mg
Paracetamol	150 mg
Caffeine	50 mg

Procedure: weigh accurately of each powder & mix them as per ascending order of their weight. Weigh 500 mg of the mixed powder for each powder & wrap each dose individual in powder paper.

Powders enclosed in cachets & capsules

- Cachets are solid dosage form of drug & cachets are also called as wafer capsules.
- These are molded from rice flour.
- Rice paper prepared from mixture of rice flour with water enclosed in between two hot, polished, cylinders.
- Then water was evaporates & wafer is formed.
- In the cachets 0.2 to 1.5 gm nauseous or disagreeable drugs in powder form are enclosed.

Powders enclosed in cachets & capsules

- Cachets are quite hard so, before swallowing they dipped in water for seconds & then placed on the tongue & swallowed with draught of water.
- After swallowing the cachets gets disintegrate & drug is released.
- **ADVANTAGES OF CACHETS:**
 - Made easily..
 - Disintegrate quickly in stomach
 - Drug can be easily dispensed
 - Large dose of drug can be swallowed by using cachets.

Powders enclosed in cachets & capsules

- **DISADVANTAGES OF CACHETS:**
 - Required soften before use or swallowing.
 - Easily damaged.
 - Cannot be protect the enclosed drug from light & moisture.
 - Shell of cachets are fragile so, drug contents cannot be compressed.
 - They are not suitable for filling the drug in large scale.
 - They occurs more space compae with tablets & capsules solid dosage form.

Powders enclosed in cachets & capsules

- **Cachets are two types:**
 - Wet seal cachets
 - Dry seal cachets
- **WET SEAL CACHETS:**
 - A wet seal cachets is made up of two similar convex halves having flat edges.
 - The weighed of powder drug is placed in one half, the edge of other half are moistened with water & placed exactly over the first half containing the drug.
 - The flat edges of both the halves are pressed together in order to seal it perfectly.

Powders enclosed in cachets & capsules



1) Wet Seal



2) Dry Seal
(without dome)



3) Dry Seal
(with dome)

Powders enclosed in cachets & capsules

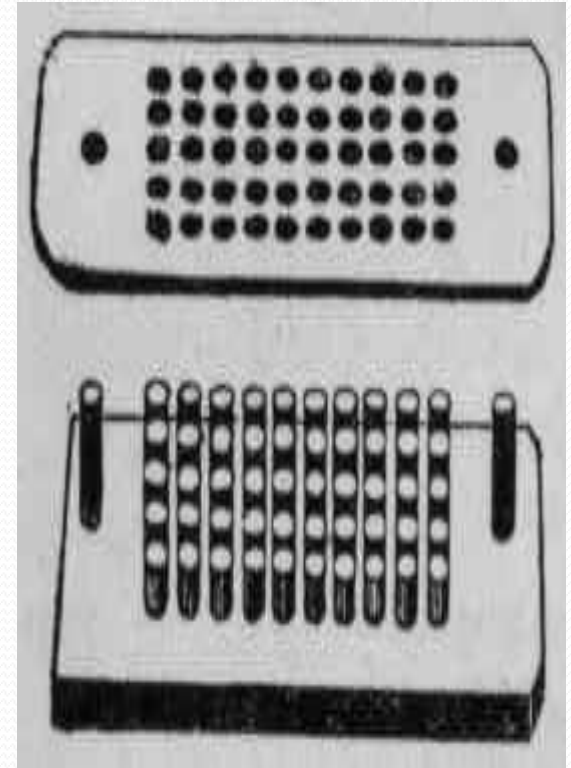
- **DRY SEAL CACHETS:**
 - Dry seal cachets consists of two halves, the upper half & lower half.
 - The diameter of upper half is slightly larger than lower half.
 - The powdered drug is filled in lower half & upper half is fitted over it.
 - The filled cachets are then sealed in a machine by pressing the two halves, removed & packed in boxes.
- B.P.C includes two cachets sodium aminosalicylate & sodium aminosalicylate with isoniazid.

Compressed powders (Tablets) or Tablet Triturates or Moulded Tablets

- In that powders moulded into tablets.
- They are flat, circular disc & usually contains potent drug.
- In that potent drugs are mixed with lactose, dextrose or some other diluents.
- The used apparatus is made up of stainless steel or plastic.
- It consist of upper & lower perforated plates & having the same numbers of halves.
- The lower plate also have two large pegs which ensure correct fitting of the plates.
- They are available in several sizes having a capacity ranging from 30 to 250 mg.
- Generally 50 to 250 tablet triturates can be prepared at a time from a tablet triturate mould.

Compressed powders (Tablets) or Tablet Triturates or Moulded Tablets

- The powder with diluents are mixed together & made a stiff paste with the help of alcohol 60%.
- Then, paste is introduced on upper plate with the help of spatula & fill all the holes & removes excess.
- This plate is placed over the lower plate.
- Then little pressure is applied over the top plate which will force the plate move downward, leaving the mould tablet on the projected pegs.
- Then, prepared tablets dried in hot air oven or by keeping in warm place.



Dispensing of Powders Involving Special Problems

- **Volatile Substances:**
 - Certain vegetable powder contains volatile oil.
 - To prevent the loss of volatile oils, these vegetable drugs must be powdered lightly in a mortar.
 - Also, menthol, camphor & essential oils takes place incorporation in powder.
 - Final product pack with double wrapping.

Dispensing of Powders Involving Special Problems

- **Hygroscopic & deliquescent powders:**
 - Absorb the moisture from atmosphere are called hygroscopic powders.
 - Absorb the moisture from atmosphere & convert into solution are called deliquescent powders.
 - E.g. ammonium chloride, ammonium citrate, pepsin, phenobarbitone, sodium iodide etc.
 - Such substance are usually provide in granular form in order to exposé less surface area to atmosphere & avoid convert into fine powder.
 - Such powder should be double wrapped.

Dispensing of Powders Involving Special Problems

- **Efflorescent powders:**
 - Some crystalline substance liberates water of crystallisation wholly or partly on exposure to humid atmosphere.
 - e.g. citric acid, caffeine, ferrous sulphate etc.
 - So, this problem overcome by mixing or incorporate with inert substance or using anhydrous salt.

Dispensing of Powders Involving Special Problems

- Eutectic mixture:
- Liquids:
 - In some prescription the liquid medicaments are also incorporated with powders.
 - In that case, if liquid quantity is small, it may be triturated with equal amount of powder, then the rest of the ingredients are incorporated in small proportions with continuous stirring.

Dispensing of Powders Involving Special Problems

- **Potent drugs:**
 - The substance having a max. dose of less than 60 mg & poisonous substances are called potent drugs.
 - It should be difficult to weigh on dispensing balance.
 - For that, firstly potent drugs incorporated with diluents such as lactose before weigh.
 - e.g. Dispense following powder in 5 powder packets
 - **Rx,**

Codeine phosphate 10 mg

In that case, weigh 100 mg of codeine phosphate & 900 mg of lactose mixed with ascending order with help of spatula.

Out of 1 gm of triturate, weigh 100 mg of each powder contains 10 mg of codeine phosphate & pack in powder paper.

Dispensing of Powders Involving Special Problems

- **Granular powders:**
 - Some solid medicaments required to administered in orally in large dose & its not possible to convert into tablet or capsule bec. a large number of them will be required to take single dose.
 - And these medicaments are difficult to dispense in powder form bec. Its bitter, nauseous & unpleasant taste.
 - In this case, solid medicaments mix with sweetening, flavoring & coloring agent with suitable granulating agent to moisten the powder to make coherent mass.
 - Then, pass through sieve no. 10 to make granules & dry in hot air oven at 60°C & after drying pass through sieve no. 20 & pack into wide mouth containers.
 - E.g. Nowadays, antibiotics like erythromycin, ampicillin etc are available in granular powder bec. They are unstable in liquid form.

- **Effervescent granules:**
 - These type of medicament granules are prepared for internal use.
 - In that, medicaments mixed with citric acid, tartaric acid & sodium bicarbonate with sweetening agents also present.
 - When contact with water they release of carbon dioxide to mask the bitter & saline taste of drug.
 - Also, carbon dioxide stimulates the flow of gastric juice & helps in the absorption of medicaments.
 - METHODS OF PREPARATION OF EFFERVESCENT GRANULES:
 - Heat Method
 - Wet Method

Heat Method:

Firstly, porcelain dish make hot on water bath before transferring the powder.

- Then, transfer the medicament with citric acid & other ingredients.
- In that stage citric acid liberates the water & produce damp mass.
- Heating stage takes 1 to 5 mint.
- Then damp mass pass through sieve & dry in hot air oven at 60°C .
- Then finally packed in air tight container.

Wet Method

- In this method, the ingredients are mixed with alcohol to produce coherent mass.
- Produced mass pass through sieve no 10 or 8 & dry in hot air oven at 60° C.
- Then dried granules are again passed through sieve to break the lumps which may be formed during drying.
- Finally, the prepared granules are packed in air tight containers.

MIXING OF POWDERS

- **Spatulation**
- **Trituration**
- **Geometric dilution**
- **Sifting**
- **Tumbling**

Cont..

- **Spatulation:** mixing the powders with help of spatula on a paper or sheet.
- **Trituration:** it is used for reduce of size & for mixing of powders.
- **Geometric dilution:** for potent drugs..
- **Sifting:** the powders are mixed by passing through sifters.
- **Tumbling:** tumbling is the process of mixing powders in a large container rotated by an electric motor. These type of blenders are widely used in industry as large volume of powder mixers.

Packing of Powder

- **Double wrapping:**
 - In that, wrap the powders by using two different types of paper.
 - Outer paper is plain paper while inner wrapping is of gelatin paper.

Thank you

