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Review Article

An Overview on Tablet Coating

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ABSTRACT

Pharmaceutical solid dosage forms include tablets, pellets, pills, beads etc. Tablet is most commonly used pharmaceutical dosage form which has ease of administration. Tablets are coated for many reason such as masking odour, taste, colour of the drug, providing physical and chemical protection to drug, protecting drug from the gastric environment. Coating is a process by which a layer of coating material is applied to the surface of a dosage form. Coating may also contain active ingredient. There are various strategies for tablet coating which include sugar coating, film coating, and enteric coating. The amount of coating on the surface of a tablet is critical to the effectiveness of the oral dosage form. Recent trends in tablet coating focuses on overcoming disadvantage of solvent based coating. This review concerns with the coating process, equipments involved, coated tablets evaluation and specialized coating techniques.

Key Words: Pharmaceutical solid dosage, coated tablets, Sugar Coating

ARTICLE INFO: Received 02 June 2019; Review Completed 28 July 2019; Accepted 3 August 2019; Available online 15 August 2019



Cite this article as:

Arora Rimjhim*, Rathore Kamal Singh, Bharakatiya Meenakshi, An Overview On Tablet Coating Asian Journal of Pharmaceutical Research and Development. 2019; 7(4):89-92, DOI: <http://dx.doi.org/10.22270/ajprd.v7i4.547>

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INTRODUCTION

Tablet is a pharmaceutical dosage form. The tablet is composed of the Active Pharmaceutical Ingredient together with various excipients which are usually in powder form, compressed into a solid dosage form. Coating is a process by which a layer of coating material is applied to the surface of a dosage form in order to obtain certain benefits that mainly ranges from ease of product identification to modifying drug release from the dosage form¹

Coated tablets are tablets which are covered with one or more layers of mixture of various substances such as resins, gums sugar, plasticizer etc. Substances used for coating are usually applied as solution or suspension under conditions where vehicle evaporates.² Coating composition is applied to a batch of tablets in tumbled coating pan so that the tablet surfaces become covered with a tacky polymeric film. During the process the tablet surface changes from a sticky liquid to tacky semisolid, and eventually to a non-sticky dry Surface.³

OBJECTIVES OF COATING⁴⁻⁶

The objectives of tablet coating are as follows:

To mask the disagreeable odor, color or taste of the tablet and increase patient compliance.

To offer a physical and/or chemical protection to the drug and protect drug from external environment (particularly air, moisture and light) in order to improve stability.

- To prolong the shelf life of the drug.
- To enhance ease of swallowing large dose forms.
- To retard loss of volatile ingredients.
- To modify and/or control the rate of drug release as in repeat-action, delayed release (enteric coated) and sustain-release products.
- To incorporate incompatible drugs together in a single dosage form
- Increasing the mechanical strength of the dosage form.

- Improving product appearance and help in identification by the manufacturer, the pharmacist and the patient (mostly colored).
- Masking batch differences in the appearance of raw materials.
- In improving product robustness.

DISADVANTAGE OF TABLET COATING

Tablet coating increase the cost of formulation. Tablet coating may interfere in pharmacodynamic properties of drug formulation. Something coating may result in various film defects like, mottling, capping, chipping, bridging. The process remained complicated.⁷

COATING PROCESS

Rotating coating pans are commonly used for coating purpose. Uncoated tablets are placed inside the pan and the liquid coating material is brought into the pan during the tumbling of tablets.⁷ Air is passed over the tumbling tablets so that liquid part of coating material gets evaporated leaving the layer of solid coating material.

The coating method is normally such as the subsequent steps:

- Batch identification and selection of type of coating. (film or sugar coating)
- Dispensing (accurate dosing of all required raw materials)
- Loading of tablets into pan.
- Warming of tablets
- Spraying (application of coating material and rolling of tablet are carried out simultaneously)⁸
- Drying
- Cooling
- Unloading⁹

FACTOR AFFECTING TABLET COATING:

TABLET PROPERTIES

To tolerate the intense attrition of tablets striking other tablets or walls of the coating equipment, the tablets must be resistant to abrasion and chipping.⁶ The ideal shape for coating is sphere¹⁰

COATING PROCESS

Type of coating Equipments and its automation also affects coating.

The key parameter which affect coating process are temperature humidity air flow.

COATING COMPOSITION⁶

Polymers
Solvents
Plasticizers
Colorants

VARIOUS KINDS OF TABLET COATING

1. Sugar Coating

Sugar coating was done to mask bitter taste of tablets. Bitter tablets are coated with sugar coat in order to mask the taste of tablet. It also provides good appearance to tablets. The process of sugar coating consists of several steps, which are as follows:

Sealing:

It provide moisture barrier to tablet and hardens it.⁸

Sub coating:

This step is done to round the edges and increase the tablet weight.⁴

Grossing/Smoothing:

This fills up the imperfection of subcoating and increases the tablet size to predetermine dimension.

Coloring:

This gives the final color to the tablet.

Polishing:

This is done to obtain desired luster.⁹

2. Film Coating

As the sugar coating process is very time consuming so this technique has been replaced by film coating technology. The process involves spraying of a solution of polymer, pigments and plasticizer onto a rotating tablet bed to form a thin, uniform film on the tablet surface.¹⁰ The choice of polymer mainly depends on the desired site of drug release (stomach/ intestine), or on the desired release rate.⁴ According to desired site it is of two types:

Compression Coating

It involves the compaction of granular materials around a preformed tablet core using specially designed tableting equipment. Compression coating is a dry process. It has advantages in some cases in which the tablet core cannot tolerate organic solvents or water and yet needs to be coated for taste masking, or to provide delayed or enteric properties to the product.²

3. Dip coating:-

Coating is applied by dipping tablet into coating liquid then wet tablets are dried in conventional coating pans. Alternate dipping and drying steps can be repeated several times until the desired coating is achieved.

4. Press Coating

Compression is used to form coat around a pre-formed core. Used mainly to separate chemically incompatible materials.

5. Enteric coating

An enteric coating is a barrier that controls the location of oral medication in the digestive system where it is absorbed. The word "enteric" indicates small intestine; therefore enteric coatings prevent release of medication before it reaches the small intestine. The enteric coated polymers remain unionise at low pH, and therefore remain insoluble. But as the pH increases in the GIT, the acidic functional

groups are capable of ionisation, and the polymer swells or becomes soluble in the intestinal fluid.

Need of enteric coating:

- To protect the stomach from the drug
- To protect the drug from the stomach
- To protect the acid liable drugs from the gastric fluid
- To forbid gastric distress or nausea due to irritation from a drug¹¹

TABLET COATING DEFECTS

Picking and sticking:

This is when the coating removes a piece of the tablet from the core. Over wetting or excessive film tackiness causes tablets to stick to each other or to the coating pan. On drying, at the point of contact, a piece of the film may remain adhered to the pan or to another tablet, giving a "picked" appearance to the tablet surface and resulting in a small exposed area of the core.¹²

Mottled color

This can happen when the coating solution is improperly prepared, the actual spray rate differs from the target rate, the tablet cores are cold, or the drying rate is out of speciation.¹²

Bridging:

This occurs when the coating fills in the lettering or logo on the tablet and is typically caused by improper application of the solution, poor design of the tablet embossing, high coating viscosity, high percentage of solids in the solution, or improper atomization pressure.¹⁰

Erosion:

This can be the result of soft tablets, an over-wetted tablet surface, inadequate drying, or lack of tablet surface strength.¹⁰

Capping and lamination

It is defined as when the lower or upper portion of the tablet separates horizontally i.e. either partially or completely from the main body of a tablet and comes off as a cap, during ejection of the tablet press or during subsequent handling. Separation of the tablet into two or more distinct layers is defined as lamination. It happens due to air entrapment during compression process or because of expansion of the tablet during ejection.¹¹

Twinning

Sticking of two tablets together is known as twinning and it is a common problem with capsule shaped tablets.

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Peeling and frosting.

This is a defect where the coating peels away from the tablet surface in a sheet. Peeling indicates that the coating solution did not lock into the tablet surface. This could be due to a defect in the coating solution, over-wetting, or high moisture content in the tablet core.

Chipping

In this the film becomes chipped, usually at the edges of the tablet.⁷

This is the result of high pan speed, a friable tablet core, or a coating solution that lacks a good plasticizer.

Orange peel

This refers to a coating texture that resembles the surface of an orange. It is defect where the film becomes chipped and dented, usually at the edges of the tablet.⁸

It is usually the result of high atomization pressure in combination with spray rates that are too high.

Blushing

It is defect where the film becomes chipped and dented, usually at the edges of the tablet.

Blooming

In this coating becomes dull immediately or after long time

CONCLUSION

Coating enhances the quality of products. The coating is applied to a dosage form that already in functionally complete. Coating controls the bioavailability of the drug. Various defects also may arise during coating. These defects can reduce the acceptability by the users and effectiveness of the product. In this review defects of coating, types of coating, factors affecting various coating processes, advantages and disadvantages of coating have been discussed. In future there is enormous possibility of developments in the area of tablet coating to achieve specific benefits.

ACKNOWLEDGMENTS

Authors are profusely thankful to the Department of Pharmaceutics at BN Institute of Pharmaceutical Sciences, BN College of Pharmacy and Rubicon Pharma, Mumbai for their help in project work.

CONFLICTS OF INTEREST

No conflict of interest.

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