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# Review on Natural Excipients in the Formulation of Oral Fast Dissolving Films

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Review Article

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ABSTRACT

oral route is the most acceptable from patient compliance. Fast dissolving drug delivery system are used to overcome the problem of difficulty in swallowing tablets or capsules. This review mainly represents the use of natural excipients such as polymers, plasticizers, flavoring agents, colorants and sweeteners for the formulation of oral fast dissolving films was more advantageous over synthetic excipients. Because of patient compliance especially with paediatric and geriatric patients these films are prepared with natural excipients..

## INTRODUCTION

### Oral Fast Dissolving films

"Oral Fast dissolving films drug delivery means a film dissolves or oral drug strip to administer drugs through buccal or sublingual absorption or it absorbs by enterically."

*Advantages of oral films*

- Dose convenience
- Less water requirement
- Zero risk of chocking
- Masking the taste
- Stability Enhancement
- Accurate dosing in comparison to syrup

*Disadvantages of oral films*

- Dose for incorporating into the strip is in between 1-30 mg only
- A number of technical limitations with use of film strips; Thickness while casting the film. Casting cannot be done by glass petriplates.
- Achieving dose uniformity
- Special equipment should be used for packaging of oral films leads to difficulty in packaging

### Natural Excipients

Natural excipients are preferred on the synthetic and semisynthetic ones because of their lack of toxicity, low cost, soothing action, availability, and nonirritant nature of the excipients.

*Natural polymers*

Because of cost efficacy and regulatory acceptance natural gums [1-3] are the most popular hydrophilic polymers

### Advantages of Natural Polymers

- As the name indicates they are available in nature [4-13] so that they are Biodegradable in nature, and they are produced by all living organisms.

- All of these plant materials are reiterating sugar polysaccharides [14-25] these are biocompatible and non-toxic
- When compared to synthetic materials cost of production is less for natural polymers
- Large quantities of natural polymers are produced due to simple production processes are involved
- Minimum chance of adverse and side effects with natural polymers [26-36] when compared with synthetic materials
- There is promotion being done by government for the plant production as pharmaceutical excipients, and it withal provides the facilities for bulk production, because of their wide applications like gum and mucilage's in industries In India and homogeneous developing countries.

  Natural polymers are various plant based materials. Plant-based material serves as an alternative to synthetic products because of different reasons:

  I. Local obtainability
  II. Ecological in nature
  III. Bio-acceptability
  IV. Having renewable source as well as lowest price when compared to synthetic products

*Guar gum*

It is also called guaran, is a galactomannan with high molecular weight of 8,000,000. It is obtained from the Guar plant as an endosperm seed Cyamopsis tetragonoloba (L) Taub. (Syn. Cyamopsis psoralioides). It is free flowing, consummately soluble, neutral polymer which is composed of sugar units and has also been approved for use in food. Guar gum [37, 38] and derivatives are used as binders and disintegrate in films and also used as a control-released agent for the drug. It is used in a concentration of 1% w/w as a disintegrant for the preparation of oral films.

*Mangifera indica gum (MIG)*

In various pharmaceutical formulations MIG is used as a disintegrating agent, binder [39-48], suspending agent, and emulsifying agent because of it's non-toxic nature. It is used as a polymer in formulation of oral films.

*Dehydrated banana Powder (DBP)*

Additionally banana is called as plantain [49-58]. DBP is used as a superdisintegrant in the formulation of oral films. It is a very good source of energy due to high carbohydrate content, and it contains potassium, which is responsible for more preponderant brain functioning.

*Pullulan*

Pullulan is a natural and extracellular microbial polysaccharide produced by the fungus-like yeast, Aureobasidium pullulans. Pullulan can be made into very thin films (down to 0.01mm) which also have more tensile strength and can stable over a range of temperatures. Pullulan can be made into films of high tensile strength and low oxygen permeability, are oil and grease resistant. Pullulan films are usually prepared with 5-10% aqueous pullulan solution by rapid evaporation and applied to a smooth surface and dried; it may also involve the use of high temperature and pressure. Pullulan can be mixed with gelatin, amylose and polyvinyl alcohol [59-67] for better release of drug.

*Plasticizers*

Plasticizers are the additives that increase the plasticity or fluidity of a material. Plasticizer [68, 69] mailnly reduces the brittleness of the strip and imparts flexibility. Based on the compatibility with the polymer plasticizer should be selected and also based on the type of solvent used for casting of the strip.commonly used plasticizers in the formulation of oral films are in the concentration of 0-20% w/w of dry polymer weight.

- Glycerol
- Propylene glycol
- Castor oil
- polyethylene glycols with low molecular weight
- Tributyl citrates, Triethyl citrates, Actyl citrates

In comparison to citric acid, tartaric acid and oleic acid Malic acid was found to be better plasticizer as it did not crystallize out after drying of the films. Maltodextrin can also be plasticized as and converted with incorporation of glycerine as well as propylene glycol as plasticizer into oral dissolving film in the concentration range of 16-20% w/w, and found to be more advantageous by using glycerin over propylene glycol as it shows miscibility problems with maltodextrin [70, 71] either by using hot melt extrusion or solvent casting methods.

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*Coloring agents*

Natural colorants are used in the formulation of oral films. All the colorants used in the formulation of oral fast dissolving films should not exceed 1% w/w as per FD&C. Following are some of the colorants used in the preparation of oral films.

1) Caramel also known as burnt sugar prepared by heating water-soluble carbohydrates with an accelerator until a black viscid mass is formed
2) Cochineal
3) Carmine

Other examples for natural colorants include
Riboflavin and Anthocyanins, Paprika Oleoresin, Beet Root Red, Annatto, Curcumin [72-90].

*Sweetening agents*

As the formulation has to be disintegrated in the oral cavity sweeteners become the important part. General concentration of sweeteners are in the concentration range of 3 to 6 % w/w either alone or in combination. Use of natural sugars in oral dissolving films need to be restricted in people who are on diet or in the case of diabetic patients. Because of this reason the artificial sweeteners [91] have gained more popularity in food and pharmaceutical preparations. First generation artificial sweeteners are Saccharin, cyclamate and aspartame. Second generation artificial sweeteners are acesulfame-K, sucralose, alitame and neotame. Bitter taste of fast dissolving films of diclofenac and ondansetron were suppressed by Sucralose [92, 93] and neotame respectively.

*Flavoring agents*

In oral fast dissolving films the concentration of flavors added is up to 10% w/w. Flavor [94-98] selection mainly depends on the type of drug to be incorporated in the **formulation (Table 1).**

| Flavors recommended | Basic taste |
|---|---|
| Wild cherry, walnut, chocolate | Bitter |
| Citrus flavor, licorice, root beer, raspberry. | Sour |
| Vanilla, fruit and berry | Sweet |
| Butterscotch, maple, apricot. | Salt |

**Table 1:** Flavors for taste Masking

## CONCLUSION

Because of their rapid disintegration, improved dissolution properties principally with paediatric [99-102] and geriatric patients oral fast dissolving films are considered as most promising and important drug delivery systems. Natural excipients usage in the preparation of oral fast dissolving films is preferable due to less expensive, biodegradable, and ecofriendly nature rather than synthetic excipients.

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