Review on Film-Forming Polymers Used in Oral Thin Film Formulations

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ABSTRACT

Recent technological progress has enabled the development of alternative oral dosage forms suitable for patients who are young, elderly, bedridden, nauseous, or have difficulty complying with conventional medications. Fast-dissolving oral thin films are solid dosage forms that disintegrate or dissolve within one minute when placed in the mouth, without the need for chewing or water. These films are formulated using a variety of components such as polymers, the active pharmaceutical ingredient, film-stabilizing agents, sweeteners, flavouring agents, colourants, saliva stimulants, preservatives, and surfactants. Among these, polymers are the most critical, as they form the structural backbone of the film. Fast-dissolving films are typically made from hydrophilic polymers that dissolve rapidly on the tongue or within the buccal cavity, allowing the drug to enter systemic circulation upon contact with saliva. Water-soluble polymers are preferred as film formers for rapidly disintegrating films because they ensure qui ck dissolution, provide a pleasant mouthfeel, and offer suitable mechanical strength

Keywords Oral thin films, Composition, Film forming polymer.

INTRODUCTION[1-10]

Oral administration remains the most widely preferred route for delivering medications because it is safe and convenient for patients . Nevertheless, traditional oral dosage forms such as tablets, capsules, and pills can pose significant difficulties for certain groups, including children, the elderly, and individuals with dysphagia or psychological barriers that make swallowing or accepting medication challenging. To overcome these challenges, modern drug delivery research has shifted toward creating innovative oral dosage forms designed to improve patient adherence and deliver medication more effectively. Fast-dissolving oral films (FDOFs) represent an advanced oral solid dosage form because they offer greater flexibility and patient comfort. They rapidly disintegrate in the mouth within seconds upon contact with saliva, eliminating the need for chewing or water. This leads to faster absorption and improved bioavailability, as the oral mucosa has high permeability and receives rich blood supply reported to be 4 to 1000 times higher than that of the skin. Instant bioavailability is achieved because these formulations avoid first-pass metabolism. Therefore, they are typically developed for drugs that undergo extensive first-pass metabolism to improve their overall bioavailability.

GENERAL ATTRIBUTES OF ORAL FILMS [11]:

Oral films, often referred to as oral wafers, are thin, flexible polymer-based sheets that contain an active pharmaceutical ingredient (API). These films are designed to be placed in the oral cavity, where they dissolve quickly or adhere to the mucosal surface. In the case of transmucosal films, the drug is absorbed directly through the oral mucosa, bypassing the gastrointestinal tract and avoiding first-pass metabolism. Oral thin films (OTFs) are small, pliable drug-loaded strips intended for administration on or beneath the tongue, where they rapidly disintegrate. When formulated for transmucosal delivery, the medication is taken up directly through the highly vascular oral mucosa, enabling fast entry of the drug into the systemic circulation.

Depending on the formulation needs and the intended dose, the API in oral films may be incorporated either in a dissolved state or dispersed as crystalline or amorphous particles within the polymer matrix. The size and thickness of an oral dissolving film mainly depend on the required API dose, although its physical characteristics are also shaped by the desired disintegration behaviour. Films with a higher surface-to-mass ratio generally disintegrate faster than those with a lower ratio. Typically, these films cover only a few square centimetres and have a thickness between 50 and 150 µm (2–6 mils), allowing them to dissolve within a few seconds.In general, film thickness may range from 1 to 10 mm, with surface areas varying from 1 to 20 cm^2 depending on the design. Due to their rapid hydration capacity, these films soften almost instantly when placed in the mouth. Wet-tack and mucoadhesive features are incorporated to help the film adhere to the application site.

Disintegration time defined as the moment when the film starts to break upon contact with water typically falls between 5 and 10 seconds for films around 2 mm thick. Dissolution time, the point at which at least 80% of the film dissolves in aqueous medium, is usually about 30 seconds at this thickness. Drug release begins as the film disintegrates and dissolves, and both of these processes take longer as the film becomes thicker. The texture and mouthfeel of the film also play a key role, as patient preference and comfort can significantly influence compliance.

IDEAL PROPERTIES [12-14]

- It should have an agreeable or pleasant taste.
- The formulation must be stable against moisture and capable of dissolving easily in saliva.
- It should provide adequate tensile strength.
- The drug should be able to ionize at the pH present in the oral cavity.

ADVANTAGES [15-18]:

- Does not require water for administration.

- Offers better stability compared to other forms.
- Simple and convenient to administer.
- Suitable for patients with mental health issues or those who struggle with conventional dosage forms.
- Leaves minimal or no residue in the mouth after use.
- Avoids gastrointestinal passage, which helps enhance bioavailability.
- Provides more accurate dosing than liquid formulations.
- Removes the need for dose measurement, a major drawback of liquid dosage forms.
- Produces a pleasant sensation in the mouth.

DISADVANTAGES [19-20]:

- Drugs that are unstable at buccal pH are unsuitable for this delivery route.
- Medications that can cause irritation to the oral mucosa should not be administered buccally.
- Only drugs requiring a small dose are appropriate for this method.
- Since most drugs have an unpleasant or bitter taste, effective taste-masking is essential

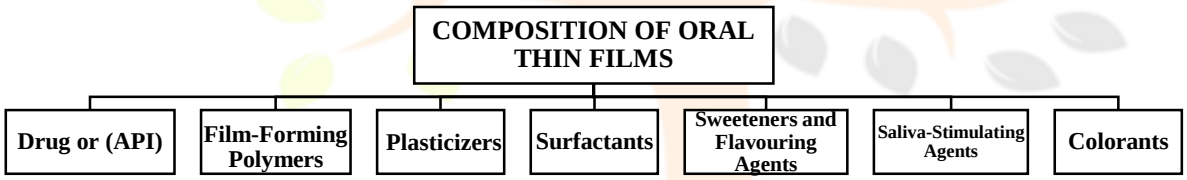

Fig.no.1 COMPOSITION OF ORAL THIN FILMS [21-22]

Oral Thin Films (OTFs) are formulated using several essential components:

I. Drug or Active Pharmaceutical Ingredient (API)

The API is the central component of the film and typically constitutes about 5–30% (w/w) of the total formulation.

Examples include drugs used for allergies, nausea, and migraines.

II. Film-Forming Polymers

Water-soluble, biocompatible polymers create the structural base of OTFs and serve as carriers for the drug. Both natural and synthetic polymers can be used, and they may be blended to obtain the required mechanical and dissolution characteristics. These polymers must be safe, non-irritating, and free from contaminants.

Examples: HPMC grades E3, E5, E15; K-3 Methylcellulose; A-3, A-6, A-15 Pullulan; pectin; gelatine; chitosan; cellulose; starch.

III. Plasticizers

Plasticizers enhance the flexibility and mechanical strength of the film, reducing brittleness. Their selection depends on the polymer type and the manufacturing technique.

Examples: Glycerol, dibutyl phthalate, polyethylene glycol.

IV. Surfactants

Surfactants act as solubility enhancers and improve wetting, promoting rapid film dissolution and efficient drug release.

Examples: Sodium lauryl sulfate, Tween, benzalkonium chloride.

V. Sweeteners and Flavouring Agents

These are added to mask unpleasant tastes or Odors of the drug and to improve patient acceptability, especially in children. Both natural and synthetic sweeteners and Flavors may be used.

Examples: Saccharin, aspartame.

VI. Saliva-Stimulating Agents

These ingredients help boost saliva secretion when the film contacts the oral cavity, ensuring faster disintegration and dissolution.

Examples: Citric acid, lactic acid, ascorbic acid.

VII. Colorants

Colorants are added to enhance the visual appeal of the film. Pigments serve as the primary colouring materials. Titanium dioxide is the most commonly used colorant in oral dissolving films and many other pharmaceutical products. Besides titanium dioxide, a wide variety of colours is available, including FD&C dyes, natural colour options, and specially customized Pantone-matched shades.

Classification of Polymer use in oral mouth dissolving films [23]:

There are three main types of polymers use in mouth dissolving formulation.

It is based on its biodegradability.

The types of polymers are as follows:

1. Natural polymers

2. Synthetic polymers

1**. NATURAL POLYMERS:** Natural polymers are available in many plant-derived varieties. Their use is preferred over synthetic materials for several reasons:

They are easily accessible locally

They are environmentally sustainable

They exhibit good biological acceptance

They are cost-effective and sourced from renewable materials

Plant-based natural compounds offer many advantages:

- Biodegradability: These materials break down naturally because they originate from living organisms, all of which produce such compounds.
- Biocompatibility and safety: Most plant-derived excipients are polysaccharides made of repeating sugar units, making them generally non-toxic and compatible with biological system
- Low cost: Natural sources are cheaper to obtain, and their production requires lower investment compared with synthetic substances. Since countries like India and other developing nations rely heavily on agriculture, cultivation of such plants is economical.
- Eco-friendly processing: Their extraction and processing are simple, making plant-based polymers widely used in pharmaceuticals and produced in large quantities.
- Easy local availability: Due to their many industrial applications, governments in developing countries including India encourage the growing of gum- and mucilage-producing plants for use as pharmaceutical excipients.
- High patient and public acceptance: Natural materials are generally associated with fewer side effects and lower risk of adverse reactions compared with synthetic alternatives.

1.Chitson [24-25]:

Chitosan is a highly promising biopolymer with significant potential in biomedical applications. Polymer-based drug delivery systems incorporating chitosan are being explored as alternatives to conventional therapies (15). Chitin, a natural polysaccharide composed of β-(1→4)-N-acetyl-D-glucosamine, is found in the shells of crustaceans such as crabs and shrimp. Unlike chitosan, chitin contains an amino group that is acetylated rather than free. Commercial chitosan is produced by deacetylating chitin obtained from crustacean exoskeletons and fungal cell walls. Despite issues related to drug solubility, Bruscato and Danti (1978) observed that adding chitin to standard tablets reduced their dissolution time to about 5–10 minutes. Measurements of surface free energy helped evaluate wetting behaviour and in-vitro dispersion within the oral cavity. Overall, chitosan is a widely used natural polysaccharide in the pharmaceutical field due to its versatility and broad applicability.

Example: Fast dissolving oral films for drug delivery preparation from Chitson [26]

2.Guar gum [27]:

Guar gum is a water-soluble natural polysaccharide obtained from the seeds of Cyamopsis tetragonoloba, a plant of the Leguminosae family. Structurally, it consists of linear chains of (1→4)-β-D-mannopyranosyl units with (1→6)-linked α-D-galactopyranosyl side groups. In the gastrointestinal tract, galactomannan portions are efficiently fermented by microbes, producing short-chain fatty acids, while the gum itself is not digested by humans or animals. Owing to its biocompatibility and biodegradability, guar gum plays an important role in biomedical and drug-delivery applications. It offers beneficial properties such as good bioavailability, adequate mechanical strength, and physicochemical stability. In pharmaceutical formulations, GG serves as a thickener, suspending agent, stabilizer, and emulsifier.

Example: Diclofenac sodium oral thin film using Guar Gum [28]

3.Xanthum Gum [29]:

Xanthan gum is a naturally occurring high-molecular-weight polymer produced by Xanthomonas campestris, a bacterium typically found on cabbage plants. It appears as a free-flowing white to cream-colored powder that dissolves readily in both hot and cold water, while remaining insoluble in most organic solvents. Even at low levels, xanthan gum forms solutions with much higher viscosity than many other polysaccharides, making it an excellent thickening and stabilizing agent. Its solutions are pseudoplastic rather than thixotropic, a property that enhances processing and ensures easy pourability. Xanthan gum also demonstrates superior thermal stability compared to most water-soluble polysaccharides. Being flavourless, it does not alter the taste of food products and can even enhance their sensory quality. Moreover, xanthan gum solutions resist changes in pH, remaining stable in both acidic and alkaline conditions

Example: Mucoadhesive buccal film of propranolol by using Xanthum Gum.[30]

4.Agar and Treated Agar [31]:

Agar is a dehydrated, gel-forming substance obtained from red algae such as Gelidium amansii and various species of Gracilaria and Pterocardiac. It is available as strips, flakes, or coarse powder, typically appearing white, yellowish-grey, or nearly colorless. Agar has a mucilaginous taste and is odourless. It consists of two main polysaccharides: agarose, which provides gel stability, and agaropectin, which contributes to viscosity. Because of its strong gel-forming ability, agar can be used as a disintegrant in formulations. Generally, these gums are employed at concentrations of 1–10%, though their disintegrating efficiency is lower than some alternatives due to their limited swelling capacity

Example: Agar based oral thin films of cetirizine Hcl [32]

5.Gelatin [33]:

Gelatine is produced by the thermal denaturation of collagen obtained from animal skin, bones, and fish tissues. When heated above 40 °C, it dissolves easily in water, forming a thick solution of randomly coiled peptide chains. Mammalian gelatins generally exhibit better mechanical strength and heat stability than most fish-derived gelatine because of their higher amino acid content. The characteristics and film-forming performance of gelatine depend largely on its molecular weight. Gelatine-based films offer several benefits: they dissolve rapidly and provide a smooth mouthfeel, making them ideal for enhancing taste.

Example: Gelatine oral thin film containing Ondansetron Hcl [34]

6.Pullulan [35] :

Pullulan is a neutral, linear, and water-soluble polysaccharide produced from starch by Aureo basidium pullulans, a type of black yeast. The enzyme pullulan's breaks specific linkages in the polymer, contributing to its unique ability to form films. The PI-20 grade, with a molecular weight of about 200,000 Da, shows excellent film-forming characteristics and is typically used at 0.3–15% w/w. Pullulan films offer exceptionally high oxygen-barrier capacity about 300 times better than HPMC films making them ideal for protecting easily oxidized vitamins and fats in food applications. Pullulan is also non-toxic, non-carcinogenic, non-immunogenic, and non-mutagenic. Being a non-ionic and biodegradable polysaccharide, it is compatible with blood. It forms strong, flexible, transparent films and is non-hygroscopic, giving it good stability and adhesion

Example Pullulan Used in Oral Thin Films (OTFs): Chlorhexidine Gluconate Oral Thin Film.[36]

7.Mango peel extract [37-38]

Mango peel, which represents about 20–25% of the waste generated during mango processing, has been identified as a valuable source for obtaining high-quality pectin. This pectin can be used to create edible films and satisfactory jellies. Pectin is a complex heteropolysaccharide and functions as a hydrophilic colloid. According to Malviya et al. (2011), although mango peel pectin is not as strong as synthetic super disintegrants, its good solubility and high swelling capacity make it suitable for formulating fast-dispersible tablets. The extracted pectin dissolves in warm water but remains insoluble in organic solvents. Evaluation results indicated that pectin obtained from mango peel can serve effectively as a pharmaceutical excipient for developing solid oral dosage forms

Example: Oral thin film formulated using mango peel extract along with cetirizine Hcl [39]

8.Dehydrated banana powder [40]:

Plantain, also known as dehydrated banana, is obtained from banana varieties such as Ethan and Nenthran (Nenthra Vazha) of the Musaceae family. It is rich in vitamin A, which supports the management of gastric ulcers and diarrhoea. The presence of vitamin B6 helps alleviate stress and anxiety. Due to its high carbohydrate content, plantain serves as an excellent energy source, and its potassium content contributes to improved brain function

Example: Oral thin mouth dissolving film of Lisinopril.[41]

9.Gellan Gum [42-44]:

Gellan gum is a naturally occurring polysaccharide produced by bacteria and is widely explored for biomedical applications because it is biocompatible and easily modified. Its repeating structural unit is a tetra saccharide containing L-rhamnose, D-glucuronic acid, and two D-glucose molecules. Like many other polysaccharides, gellan gum can be broken down by lysozyme released from monocytes and neutrophils. The rate of degradation can be adjusted by altering the extent and type of crosslinking, whether through physical or chemical bonds. Similarly, modifying the crosslinking approach can also change the material's mechanical strength. Cations can cross-link gellan gum by neutralizing charges along the polymer chain and encouraging physical network formation. Multivalent cations are especially effective as they bridge carboxyl groups and reduce electrostatic repulsion. Monovalent ions, although capable of charge screening, interact more weakly compared to the strong ionic bonds formed with divalent cations. Consequently, hydrogels cross-linked physically with gellan gum tend to lose structural stability in the body as divalent ions are displaced by the more abundant monovalent ions under physiological conditions.

Example : Mucoadhesive buccal film using Gellan Gum for propranolol hcl [45]

10. Sodium alginate [46]:

Sodium alginate is a natural polymer made up mainly of the sodium salt of alginic acid, a polyuronic acid consisting of D-mannuronic acid and L-guluronic acid units. This indigestible biopolymer is derived from brown seaweeds (Phaeophyceae, especially Laminaria), where it occurs in the cell walls as calcium, magnesium, or sodium alginate. Owing to its distinctive colloidal characteristics including thickening, stabilizing, suspending, film-forming, gelling, and emulsifying abilities alginate is suitable for creating biopolymer films or coating materials. However, due to its hydrophilic nature, alginate-based edible films exhibit good strength but limited resistance to moisture. Their water vapor permeability and mechanical performance are moderate when compared to synthetic films. Incorporating starch can enhance the mechanical strength of alginate films. When used as a film-forming base, the addition of sorbitol or mannitol improves the adsorption capacity of medicinal carbon films relative to their powder form, while still offering adequate strength and acceptable disintegration time.

Example : Formulation and Optimization of Sodium Alginate Polymer Film as a Buccal Mucoadhesive Drug Delivery System Containing Cetirizine Dihydrochloride [47]

11.Maltodextrin [48-49]:

Maltodextrins (MDX) are produced by partially hydrolysing starch using appropriate acids or enzymes. They are water-soluble biopolymers made up of linear amylose, branched amylopectin, and small amounts of dextrose and maltose. The dextrose equivalent (DE) represents the total reducing power of all sugars in the hydrolysate, expressed relative to glucose, which has a value of 100 . MDX with a low DE has a higher molecular weight, making the material more flexible and less prone to cracking. The DE also influences many physical and functional properties, including solubility and taste. Maltodextrins with a DE under 20

are non-sweet, nutritive carbohydrate mixtures composed of D-glucose polymers. As the DE increases, solubility and hygroscopicity rise, while viscosity, resistance to crystallization, and freezing point decrease.

Example: Maltodextrins oral thin film of Ibuprofen [50]

➢ SYNTHETIC POLYMER [51]

Synthetic polymers are man-made materials produced through various chemical reactions, as they do not occur naturally. They are broadly divided into two main groups:

- Biodegradable synthetic polymers
- Non-biodegradable synthetic polymers

1.Carboxy methyl cellulose [52-53]:

Carboxymethylcellulose (CMC) is a modified cellulose polymer made by reacting cellulose with sodium Mon chloroacetate. Owing to its affordability, it is widely used in pharmaceutical formulations, especially as a thickening agent and in products requiring rapid disintegration. Commercial CMC has a degree of substitution between 0.4 and 1.5, and this parameter greatly affects its film-forming behavior; higher substitution reduces inter-chain bonding, thereby influencing film properties. CMC is capable of producing clear films that can incorporate many different APIs, making it a valuable component for designing effective polymeric matrices Studies have also shown that CMC blends well with starch, forming uniform films with improved mechanical strength and barrier characteristics. However, some researchers have noted that films made with HPMC and CMC tend to be stronger and more elastic in vivo compared to sodium-based formulations

Example: Montelukast sodium oral thin film prepared using CMC [54]

2. Polyvinyl alcohol [55-57]:

Polyvinyl alcohol (PVA), developed nearly 90 years ago, was the earliest synthetic colloid. It is produced by first polymerizing vinyl acetate to form polyvinyl acetate, which is then hydrolysed to remove the acetate groups. PVA is valued for its biodegradability, biocompatibility, chemical stability, and strong mechanical performance. It is a safe, water-soluble synthetic polymer. Due to its excellent barrier properties stemming from its compact monoclinic crystalline structure PVA and its blends are widely used in coatings, optical films, packaging, and nanofiber application. Despite these benefits, PVA films can sometimes be brittle and challenging to work with, and the polymer decomposes slowly, especially in environments lacking oxygen.

Example: Formulation of Orally Disintegrating Films as an Amorphous Solid Solution of a Poorly Water-Soluble Drug [58]

3.Polyvinyl pyrrolidone [59]:

Polyvinyl pyrrolidone (PVP), also known as povidone, is a synthetic polymer composed of linear 1-vinyl-2-pyrrolidinone units. It is produced in different molecular weight grades based on its degree of polymerization. Because PVP dissolves in both water and many organic solvents, it allows flexibility in selecting a suitable solvent system. However, its film-forming ability varies with molecular weight; lower

molecular weight PVP forms weaker films and therefore needs to be combined with other polymers to create fast-dissolving films.

Example: Polymer used: PVP K30 as film-forming and solubilizer. [60]

4. Hydroxypropyl Cellulose [61]:

Hydroxypropyl cellulose (HPC) is a non-ionic, thermoplastic, water-soluble polymer. It is a partially substituted poly(hydroxypropyl) ether of cellulose and may contain a suitable anti-caking agent or not more than 0.6% silica. HPC is commercially available in multiple grades that differ in solution viscosity . Polymers with high glass transition temperatures typically form rigid films, and HPC behaves similarly. Films produced with HPC tend to be stiff, exhibit high elastic modulus, and show very low elongation (under 5%), resulting in brittle fracture due to its comparatively high glass transition temperature. These films generally provide good clarity, strong drug-loading capacity, and slower dissolution. HPC is an effective film-forming agent and is the only thermoplastic cellulose derivative that dissolves in water, making it a preferred primary matrix former. Its softening point ranges from about 100°C to 150°C, depending on molecular weight. HPC can be used alone or blended with Hypromellose to obtain more flexible films because its solutions exhibit low surface and interfacial tension.

Example: Fast dissolving oral thin film of zolmitriptan [62]

5.Sodium carboxymethyl cellulose [63]:

Sodium carboxymethylcellulose (Na CMC) is produced by treating cellulose with alkali and monochloroacetic acid to form its sodium salt. It is a non-ionic cellulose ether widely used in hydrophilic matrix systems for controlled drug release. Na CMC is non-toxic, capable of holding higher drug loads, and serves as an excellent film-forming polymer. Hydrophilic polymers like Na CMC, xanthan gum, and HPMC are useful for delivering medications to moist surfaces. Enzymatically modified CMC also shows good film-forming properties. Reports indicate that Na CMC is commonly combined with other film-forming polymers for preparing oral films.

Example: Sodium carboxymethyl cellulose (NaCMC) was used as a film-forming polymer in the formulation of a fast-dissolving oral film of Risperidone [64]

6.Croscarmellose Sodium [65]:

Croscarmellose sodium is a cross-linked form of carboxymethyl cellulose. It differs from sodium starch glycolate not only in the polymer backbone cellulose versus starch but also in the method used to modify the polymer. It has a higher degree of substitution (DS) than sodium starch glycolate and employs a unique cross-linking mechanism. The sodium salt of carboxymethylcellulose is synthesized via Williamson ether formation. Unlike SSG, where phosphate ester bonds form the cross-links, croscarmellose sodium creates cross-links through dehydration of some carboxymethyl groups, resulting in carboxyl ester linkages instead of phosphate ester bonds, as seen in Primojel.

Example: Formulation and evaluation of etoricoxib oral disintegrating thin films [66]

7.Polyethylene glycol [67-69]:

Polyethylene glycols (PEGs) are widely used in pharmaceutical formulations for parenteral, topical, ophthalmic, oral, and rectal delivery. They have also been evaluated as components of biodegradable polymer matrices in controlled-release systems. PEGs are hydrophilic, stable, and generally non-irritating to the skin. Although they do not readily penetrate the skin, they are water-soluble and can be easily washed off, making them suitable as bases for ointments. Additionally, PEGs can enhance the solubility and dissolution of poorly water-soluble drugs by forming solid dispersions with the appropriate PEG grade.

Example: Development of Polyvinyl Alcohol/Polyethylene Glycol Copolymer-based Orodispersible Films Loaded with Entecavir: Formulation and In vitro Characterization [70]

Table no. 1 Properties and key findings of representative polymers used for preparation of thin film formulations [71-75].

Polymer	Properties	Key findings
Hydroxypropyl methylcellulose (HPMC)	• White,creamy,odourless, and tasteless powder. • Mw 10,000–1,500,000 • Soluble in cold water, but insoluble in chloroform • and ethanol	• Film forming ability at 2–20% concentrations • Generally used for controlled and/or delayed release of the drug substance
Carboxymethyl cellulose (CMC)	• White, odourless powder • Mw 90,000–700,000 • Easily dispersed in water to form a clear	• Improved the residence time of HPC and sodium alginate films • Good compatibility with starch forming • single-phase polymeric matrix films with improved mechanical and barrier properties
Poly (vinyl pyrrolidone) (PVP)	• Wide range of solubility Non-ionic • High swelling properties • Used as co-adjuvant to increase mucoadhesion	• Blending of PVP with PVA and HPMC improves film forming ability
Chitson	• White or creamy powder or flakes, and odourless Obtained after partial deacetylation of chitin Biocompatible.	• Excellent film forming ability Chitosan enhances the transport of polar drugs across epithelial surfaces

	• Sparingly soluble in water; practically insoluble in ethanol (95%), other organic solvents, and neutral or alkali solutions at pH above approximately 6.5.	• Possesses cell-binding activity due to polymer cationic polyelectrolyte structure that binds to the • negative charge of the cell surface
Sodium alginate	• Occurs as a white or buff powder, which is odourless and tasteless. • Purified carbohydrate product extracted from brown seaweed by the use of dilute alkali.	• Used as immobilization matrices for cells and enzymes, controlled release of bioactive substances • Excellent gel and film forming properties • Compatible with most water-soluble thickeners • and resin

Conclusion:

Fast-dissolving or orally dissolving films represent a novel approach in oral drug delivery. They are especially beneficial for paediatric and elderly patients, as they enhance patient compliance. Compared with traditional dosage forms, these films offer several advantages. The choice of polymer plays a crucial role because it directly influences how quickly the film dissolves or disperses in the mouth.

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