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Review Article

Review on Film Coating Techniques for Iron Folic-Acid Tablets

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ABSTRACT

This review focuses on different film coating approaches used for Ferrous Ascorbate and Folic Acid tablets, which play a vital role in enhancing tablet appearance, taste, stability, and drug release. Conventional sugar coating improves palatability but adds weight and extends processing time. In contrast, modern film coating techniques employing polymers such as hydroxypropyl methylcellulose (HPMC), ethyl cellulose, and polyvinyl alcohol (PVA) provide better protection against moisture and enable controlled release. Enteric coatings safeguard the active ingredients from gastric acid, while ready-to-use coating systems like Opadry simplify the manufacturing process and ensure uniformity. The review also highlights the increasing interest in natural polymers like chitosan and plant-based materials for eco-friendly and safe applications. Various process parameters—such as temperature, spray rate, and drying conditions—are discussed, along with evaluation parameters like dissolution, disintegration, friability, and stability. Overall, modern coating technologies have improved the quality, performance, and patient acceptability of Ferrous Ascorbate and Folic Acid tablets. Further studies on biodegradable coating agents and process optimization can lead to more efficient and sustainable pharmaceutical products.

Keywords: Film coating, Ferrous Ascorbate, Folic Acid, Polymer coating, Tablet formulation

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INTRODUCTION

In today's world, science and technology are playing a very important role in making our lives easier and healthier. Whether it is medicine, education, or daily household tasks, advancements have made things faster, safer, and more effective. In India, we are seeing a lot of growth in fields like healthcare, agriculture, and communication. At the same time, the need to stay updated and informed is becoming more important than ever before. With the rise in diseases and health-related problems, research and development in medicines and treatment methods have gained a lot of attention. Scientists and healthcare experts are working together to find better solutions and improve the quality of life for people. Along with this, education and awareness among people are helping in preventing many health issues[1-5].

In villages and small towns, access to proper healthcare facilities and medicines is still a challenge. Therefore, it is necessary to spread awareness and ensure that modern treatment methods reach everyone. Government schemes, private hospitals, and NGOs are playing a key role in supporting this development.At the same time, traditional practices and herbal medicines are being combined with modern technology to create better healthcare products. Many Indian plants and herbs are being studied for their health benefits, which shows how our culture and science can work together[3-4].Following table no. 1 is showing about the techniques of film coating.

It becomes important to understand how medicines are prepared, tested, and made available for use. By learning about research, healthcare practices, and the latest technologies, we can contribute to making our country healthier and more informed.

Objectives

A. To explain the different film coating techniques used in making iron and folic acid tablets and how they help in improving the tablets.

B. To describe the materials used for coating, how they work, and the methods to test and improve the coating process for better results.

Table 1: Film Coating Techniques

Sr. No.	Technique	Material	Benefit	Limitation
1	Sugar	Sugar	Masks taste	Thick, slow
2	Polymer	HPMC, PVA	Stability, controlled release	Process sensitive
3	Enteric	CAP, Methacrylic copolymers	Acid protection	Costly
4	Ready-to-Use	Pre-formulated	Uniform, scalable	Expensive
5	Natural	Chitosan, Plant gums	Eco-friendly	-

METHODOLOGY OF REVIEW

In this review, I collected information to learn about the film coating methods used in making tablets like Ferrous Ascorbate and Folic Acid tablets. I searched for useful articles and reports from trusted sources like PubMed and other medical websites. I used important keywords like "film coating," "Ferrous Ascorbate tablets," "Folic Acid coating," "coating materials," and "evaluation of coated tablets" to find the right information. These helped me find details about how coating is done, what materials are used, and how the tablets are checked after coating.

I only reviewed studies and articles from the last 10 to 15 years so that the information is new and correct. In this review multiple research papers, review articles, were used.

After selecting the articles, I read them carefully and wrote down the important points. I collected data about different coating methods, materials used for coating, how coating is done, and how the coated tablets are tested. Then I arranged this information by the type of coating and tablet. This helped me understand how coating works and what improvements are being made in making better tablets.

Findings of this Review

In this review, different film coating techniques used in making tablets were studied. Coating helps in improving the appearance, taste, stability, and effectiveness of tablets like Ferrous Ascorbate and Folic Acid. The following findings explain the various methods, materials used, and their advantages and limitations.

A. Film Coating Techniques

- **Sugar Coating:** Sugar coating is one of the oldest methods used to cover tablets. It involves several steps where layers of sugar are applied to the tablet surface. This technique helps in making tablets taste better and look more attractive. It is mainly used when a medicine has a bitter taste or needs to be covered for better appearance. However, this process takes a lot of time and results in tablets that are thicker and heavier, which can be difficult for some patients to swallow[5].
- **Polymer Film Coating:** Polymer film coating is widely used in modern tablet formulations. Polymers like hydroxypropyl methylcellulose (HPMC), ethyl cellulose, and polyvinyl alcohol (PVA) are commonly used for coating. These materials help in controlling how the medicine is released in the body, protecting the tablet from moisture, and improving the stability of the product. This technique is faster than sugar coating and provides better protection to the tablet[6].
- **Enteric Coating:** Enteric coating is designed to protect tablets from the acidic environment in the stomach. It prevents the medicine from breaking down too early and ensures that it reaches the intestine where it is absorbed. Common materials used for this coating include cellulose acetate phthalate and methacrylic acid copolymers. This method is helpful for medicines that can irritate the stomach or need to be absorbed in the intestine[7].
- **Opadry and Ready-to-Use Coating Systems:** Opadry and other ready-to-use coating systems are newer methods that make the coating process simpler and faster. These systems come with pre-formulated coating materials that ensure consistency in coating and make scaling up production easier. This helps manufacturers save time and maintain the same quality in every batch[8,10,11].
- **Film Coating with Natural Polymers:** There is growing interest in using natural materials for tablet coating. Plant-based polymers, chitosan, and gums are being explored as eco-friendly options. These materials are considered safe, biodegradable, and sustainable. Research is ongoing to find new ways to use natural polymers without affecting the performance of the tablets[9,12].

B. Coating Materials Used: In tablet coating, different materials are used to help the coating stick well, look good, and work properly in the body. These materials play an important role in making tablets easier to swallow and more effective.

- **Polymers, Plasticizers, and Anti-Tacking Agents:** Polymers are the main material used in coating. They form a thin film on the tablet's surface to protect it from moisture and help control how the medicine is released. Common polymers include hydroxypropyl methylcellulose (HPMC) and ethyl cellulose. Plasticizers like triethyl citrate and polyethylene glycol are added to make the coating flexible and less likely to crack. Anti-tacking agents are used to prevent the tablets from sticking together during the coating process. These materials ensure that the coating is smooth and durable[5,13,14].
- **Surfactants for Uniform Coating:** Surfactants are also added to the coating mixture. They help the coating spread evenly over the tablet surface so that each tablet has the same amount of coating. This improves the appearance and helps the coating stay in place during manufacturing and storage[6].
- **Colorants and Flavors for Patient Acceptability:** Colorants and flavors are used to make tablets more attractive and easier to take. Different colors help in identifying medicines, while flavors help to mask the

unpleasant taste of some drugs. These additions make it easier for patients, especially children and older people, to take the tablets without discomfort[7].

C. Process Parameters

In tablet coating, the way the process is carried out is very important. Different machines, temperatures, and other conditions help in making sure the coating is applied properly and the tablets are of good quality.

- **Coating Pan vs Fluidized Bed Coating**: There are different types of machines used for coating tablets. One common machine is the coating pan**,** where tablets are rotated in a large round pan and the coating is sprayed on them. Another method is fluidized bed coating**,** where tablets are suspended in air and the coating is sprayed from below. Both methods are used depending on the type of tablet and coating required. Fluidized bed coating gives better control and faster drying, while coating pans are simple and cost-effective[8,15].
- **Temperature, Spray Rate, and Atomization Pressure**: During the coating process, temperature plays a big role. The right temperature helps the coating stick well and dry at the correct speed. The spray rate**,**which is how fast the coating liquid is sprayed, must be controlled to avoid uneven coating or tablets sticking together. Atomization pressure is the force used to break the coating liquid into small droplets. This helps in spreading the coating evenly on all tablets[9].
- **Tablet Bed Movement and Drying Conditions**: The movement of tablets in the coating machine is also important. Proper movement makes sure that all sides of the tablets get coated. At the same time, the drying conditions must be carefully managed. If the tablets dry too fast or too slow, it can cause cracks or uneven coating. Good airflow and controlled temperature help in proper drying and ensure that the tablets are coated smoothly[5,16].

D. Evaluation of Coated Tablets

After tablets are coated, it is necessary to test them to make sure the coating is done properly and the tablets are safe and effective for use.

- **Thickness Uniformity and Weight Gain:** One important test is to check if the coating is spread evenly on all tablets. This is called thickness uniformity. Another test measures how much weight the tablets gain after coating. If the coating is too thick or too thin, it can affect how the medicine works in the body[8].
- **Disintegration and Dissolution Profiles:** It is also checked how fast the tablets break down in the stomach or intestine. This is called the disintegration test. Another test, the dissolution profile, shows how the medicine is released from the tablet over time. These tests make sure that the coating does not stop the tablet from working properly[7,15,16].
- **Moisture Uptake and Stability Under Accelerated Conditions:** Tablets are tested to see how much moisture they absorb. If they absorb too much moisture, they may spoil or become less effective. The tablets are also kept in hot and humid conditions to test their stability. This helps to understand how long they can be stored safely[9,15].
- **Taste Masking Efficiency:** For medicines that taste bad, coating helps to cover the taste. A test is done to see if the coating is helping to mask the unpleasant taste. This is important, especially for children or older patients[7].
- **Mechanical Strength and Friability:** The tablets are tested to check their strength. They should be strong enough not to break easily during packing or transport. The friability test checks if the tablets crumble or lose pieces when handled[8,9,16].
- **Assay of Active Ingredients Before and After Coating**: Finally, the amount of medicine in the tablet is checked before and after coating. This ensures that the coating process has not reduced the medicine's effectiveness[7-9,16].

DISCUSSION

This review shows that both traditional and modern coating methods are used for Ferrous Ascorbate and Folic Acid tablets. Sugar coating helps in taste masking, while polymer film coating, enteric coating, and ready-to-use systems offer better protection and stability. Modern techniques are making tablet formulation easier, faster, and more reliable, which helps in improving patient experience and treatment outcomes. However, challenges like high cost, difficulty in scaling up, and ensuring uniform coating still exist. Moisture sensitivity and tablet breakage are common problems that need more attention. In the future, developing new polymer blends can help in making tablets more stable, while innovations in coating can further improve taste masking and reduce side effects like stomach irritation. Research in biodegradable polymers and new coating methods will benefit both the industry and patients. Also, meeting global regulatory requirements will ensure that coated tablets are safe and effective in different markets.

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