Formulation and evaluation of aspirin tablet

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Abstract :

The purpose of the present study is to use the wet granulation process to prepare aspirin tablets. In addition to aspirin, the preparation contains HPMC, magnesium stearate and starch. The mixture is injected into a punching machine, the different tablets are checked (weight, diameter and bone thickness, hardness, break, break and dosage) and the results are analyzed. Tested models are shown to be similar to commercial models and comply with official regulations. With the current system, more research will be planned using other active ingredients and other effective ingredients to obtain a cost-effective product.

The prepared stone tablets are evaluated based on bulk density, compressed density, aspect ratio and stiffness, as well as weights.

Key words:

Aspirin, Formulation, Evaluation, Test.

INTRODUCTION

A tablet is a pharmaceutical dosage form made up of a powdered mixture of active ingredients and excipients that is pressed or compressed into a solid dose. Glidants (flow aids), diluents, binders or granulating agents, and lubricants can be used to ensure efficient tableting; disintegrants can be used to promote tablet break-up in the digestive tract; sweeteners or flavours can be used to improve taste; and pigments can be used to make the tablets visually appealing tablets are one of the most frequently prescribed oral solid dosage forms for drug delivery. Because of their inherent ease of handling, administration, low cost therapy, and high level of patient compliance . A tablet formulation can be prepared using three methods: direct compression, dry granulation, or wet granulation .Direct compression has the fewest steps and is best for formulations that can be mixed well and do not require further granulation, such as powders with good flow, powders with high dose, and powder blends that do not segregate easily , Dry granulation consists of blending, followed by compaction and size reduction of the blend, to produce a free-flowing granular blend for tableting. In wet granulation, the liquid binder is used to prepared granules from the formulation blends, this technique has more steps than direct compression and dry granulation. Tablets and capsules, on the other hand, now account for more than a two third of all pharmaceuticals produced worldwide, both in terms of quantity and cost. Tablets are a solid dose form which is conventional and has a number of benefits over other dosage forms.

The following are the Properties of an ideal tablet:

1)The purpose of pill design and manufacture is to deliver the right medicine in the right form at the right time.

2)It must be chemically and physically stable in order to maintain its integrity over time.

3) It should be able to prevent any change in the chemistry and chemistry of the drug.

4) It must withstand mechanical disturbances that occur during production, packaging, transportation and distribution.

.Advantages :.

1) Tablets are the most effective dosage form of any dosage form and have the highest formulation and least material changes.

3) Cheap.

4) Light and limit.

5) Its chemical and microbiological stability is good for all kinds of dosage forms.

6) Suitable for mass production.

7) It is easy to swallow and has less chance of causing constipation.

8) Coating method can mask unpleasant odours and bitter tastes.

9) Enteric coating can be used for sustained release formulation

10) easy to handling

11)They are in general the easiest and cheapest to package and

ship of all oral dosage forms.

12)They may provide the greatest ease of swallowing with the least tendency for "hang-up" above the stomach, especially when coated, provided that tablet disintegration is not excessively rapid.

13) They provide certain specific release profiles, such as incoming or late-release products.
14) It is more suitable for high efficiency than other oral methods

Disadvantages:

1)Children and unconscious patients may have difficulty swallowing.
2) Due to their amorphous structure and low density, some chemicals are resistant to condensation **in** many areas.

3) Medicines with poor wet properties, fast diffusion processes, and maximum absorption through the intestine can be difficult to extract or tablets and provide complete or complete bioavailability.
4) Bitter test items, drugs with bad odors, and drugs that are sensitive to oxygen should be covered or covered. In such cases, capsules can be the best and most cost-effective **solution.**
5) Some strong substances have a negative effect on the intestines (eg aspirin).

AIM: FORMULATION AND EVALUATION OF ASPIRIN 250 MG TABLETS.

OBJECTIVE:
This review shows that there are still many issues in the USP Apparatus 2 dissolution study that can be determined directly from the geometry of the system and hydrodynamics. Therefore, this research group has recently developed a version of USP Apparatus 2, called "OPI" (Off-Centre Paddle Impeller), which retains the main features of Apparatus 2, and make it weak. these people. Therefore, USP Apparatus 2 creates a device that is deliberately removed from its center and placed outside the factory. Although the OPI method can reduce some of the weaknesses of the current 2 devices, it is important to determine its ability to discriminate tablets with different media profiles.

Drug profile: Aspirin
Generic Name: Acetylsalicylic acid :
Background:

Also known as *Aspirin*, acetylsalicylic acid (ASA) is a commonly used drug for the treatment of pain and fever due to various causes. Acetylsalicylic acid has both anti-inflammatory and antipyretic effects. This drug also inhibits platelet aggregation and is used in the prevention of blood clots stroke, and myocardial infarction (MI)

Interestingly, the results of various studies have shown that long-term use of acetylsalicylic acid can reduce the risk of various cancers, including colon, esophageal, breast, lung, prostate, liver, and skin cancer. Aspirin is classified as non-selective cyclooxygenase (COX) and is available in many doses and forms, including chewable tablets, suppositories, extended-release forms, and

others.
Acetylsalicylic acid is the most common cause of accidental poisoning in children. It should be kept out of the reach of small children, infants and young children.

Structure:

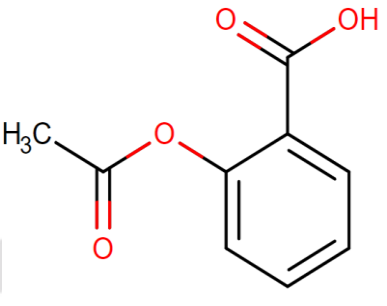

Fig No. 1 structure of Aspirin

Mechanism of action:

Acetylsalicylic acid (ASA) blocks prostaglandin synthesis. It is non-selective for COX-1 and COX-2 enzymes. Inhibition of COX-1 results in the inhibition of platelet aggregation for about 7-10 days (average platelet lifespan). The acetyl group of acetylsalicylic acid binds with a serine residue of the cyclooxygenase-1 (COX-1) enzyme, leading to irreversible inhibition . This prevents the production of pain-causing prostaglandins. This process also stops the conversion of arachidonic acid to thromboxane A2 (TXA2), which is a potent inducer of platelet aggregation. Platelet aggregation can result in clots and harmful venous and arterial thromboembolism, leading to conditions such as pulmonary embolism and stroke.

It is important to note that there is 60% homology between the protein structures of COX-1 and COX-2. ASA binds to serine 516 residue on the active site of COX-2 in the same fashion as its binding to the serine 530 residue located on the active site of COX-1. The active site of COX-2 is, however, slightly larger than the active site of COX-1, so that arachidonic acid (which later becomes prostaglandins) manages to bypass the aspirin molecule inactivating COX-2. ASA, therefore, exerts more action on the COX-1 receptor rather than on the COX-2 receptor. A higher dose of acetylsalicylic acid is required for COX-2 inhibition.

Half Life: 3.5 and 4.5 hours
Route of elimination: Renal
Volume of distribution:

This drug is distributed to body tissues shortly after administration. It is known to cross the placenta. The plasma contains high levels of salicylate, as well as tissues such as spinal, peritoneal and synovial fluids, saliva and milk. The kidney, liver, heart, and lungs are also found to be rich in salicylate concentration after dosing. Low concentrations of salicylate are usually low, and minimal concentrations are found in feces, bile, and sweat.

Route of elimination: kidney

EXCIPIENT PROFILE:

1. **methyl cellulose:**

Synonyms: Celevac, Cellothyl , Citrucel, Colonel, Dacryolarmes

Chemical Name: methyl Cellulose

Structural Formula:

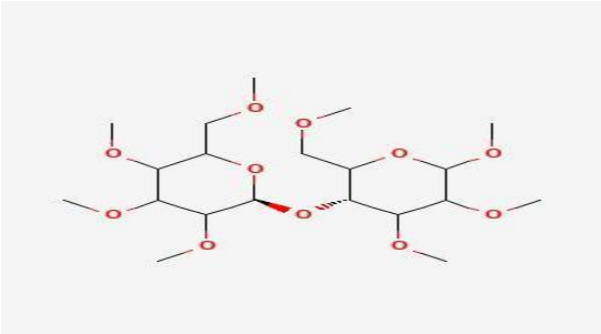

Fig No. 2 structure of methyl cellulose

Functional Category:

- Coating agent tablet binder; thickening agent; viscosity-increasing agent, emulsifying agent

2. Starch:

Synonyms:

Amido; amidon; amilo; amylum; C*PharmGel; Eurylon; fecule; Hylon; maydis amylum; Melojel; Meritena; oryzae amylum;

Chemical Name: Starch

Empirical Formula: (C6H10O5) n

Structural Formula:

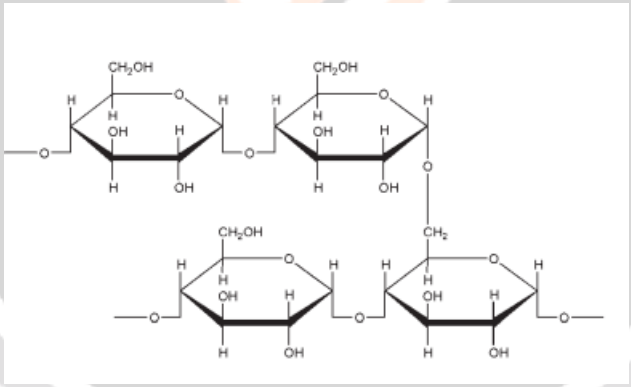

Fig No. 3 structure of starch

Functional Category:

Tablet and capsule diluent; tablet and capsule disintegrant; tablet binder; thickening agent.

1. Magnesium sterate:

Synonyms: Dibasic magnesium stearate; magnesium distearate; magnesia stearas; magnesium octadecanoate; octadecanoic acid, magnesium salt; stearic acid, magnesium salt; Synpro 90.

Chemical Name:

Octadecanoic acid magnesium salt

Empirical Formula: C36H70MgO4

Structural Formula [CH3(CH2)16COO]2Mg

Functional Category: Tablet and capsule lubricant.

Typical Properties:

Crystalline forms: High-purity magnesium stearate has been isolated as a trihydrate, a dihydrate, and an anhydrate.

Density (bulk): 0.159 g/cm3
Density (tapped): 0.286 g/cm3
Density (true): 1.092 g/cm3
Flash point 2508C
Flowability: Poorly flowing, cohesive powder.
Melting range; 117–1508C

Formula for tablet :

Table no. 1 Formulation batches containing different concentration of binder.

Sr.no	Ingredients	F1 (gm)	F2(gm)	F3(gm)	Functional category
1.	Aspirin	5	5	5	API
2.	HPMC	1	2	3	Binder
3.	Starch	1.4	1.4	1.4	Diluent
4.	Magnesium sterate	0.5	0.5	0.5	Lubricant
5	Water	q.s	q.s	q.s	Granulating vehicle

Procedure:

1.Take 5gm of aspirin 1 gm of methyl cellulose and add pup an enough granulating agent (starch) was added Slowly to prepare wet mass.

2.Granules were prepare by sieving method using sieve no #20 sieve.

3.Further granules were stored in dedicator until compression of tablet.

4.Required amount of granules were weighed and compression using automatically operated tablet punching machine lubricant combination are agents added in small quantities to the tablet during tablet preparation .

Wet granulation Method:

Active pharmaceutical ingredient (API) and all the other excipients, as mentioned in Table 1, were accurately weighed and were passed through 60 mesh sieve in order to remove foreign material and to get uniform particle size. Take 5gm of aspirin 1 gm HPMC and add starch an enough granulatingagent (water) was added Slowly to prepare wet mass. Granules were prepare by sieving method using sieve no #20 sieve. Granules are dried in hot air ovent for 15 min at 120 °c. further granules are lubricated with the addition of magnesium stearate. Compression was done with compression machine.

Three trial batches (F1, F2 and F3) were prepared using the same procedure on alternate days as described above and each batch was tested on day of compression in order to avoid any change in hardness, moisture content and any other physical parameter. All the batches were compressed at room temperature .

Evaluation Test of tablet:

Weight variation:

Weight variation test of each trail formulation and commercial brands was carried out by taking average weight of 20 individually weighed tablets on an analytical balance (Sartorious GmbH type A 6801) and compared with permissible limits.

Friability:

Friability test was preformed on twenty randomly selected tablets of each brand and trial formulation batches which were cleared from any loose dust with help of soft brush and weighed accurately for their initial weight. Each set of tablets were placed separately in Friability Tester (H. Jurgens and Co- GmbH, D2800, Germany) and run for 4 minutes (25rpm). After removing from tester, tablets were cleared from any loose dust and their final weight was determined to calculate loss .

Fig N0. 4 Roche friabilator.

Hardness:

Tablet requires a certain amount of strength or hardness and resistance to friability to withstand mechanical shakes during handling in the manufacture, packaging, and shipping. Hardness generally measures the tablet crushing strength. The hardness of tablets was determining Pfizer hardness tester. Hardness of randomly selected 10 tablets of each brand and trial formulation batch was measured using Hardness Tester Load was given to tablets in a diametric direction to determine an actual load when the tablet was broken

Fig No.5 Monsanto hardness tester

The U.S.P. device to test disintegration consists of 6 glass tubes that are 3inchlong; open at the top and 10 mesh screens at the bottom end. During the disintegration test, one tablet is placed in each tube and the basket rack is positioned in a 1-L beaker of either water, simulated gastric fluid or simulated intestinal fluid at 37 ± 2 °C such that the tablet remains 2.5 cm below the surface of liquid on their upward movement and not closer than 2.5 cm from the bottom of the beaker in their downward movement. Move the basket containing the tablets up and down through 5-6 cm at a frequencyof 28 to 32 cycles per minute .

Fig No. 6 Disintegration test apparatus

Drug content:

The tablets were powdered, and 250 mg equivalent weight of aspirin in tablet powder was accurately weighed and transferred to a 100-ml volumetric flask. Initially, 10 ml of phosphate buffer (pH 7.2) was added andshaken for 10 min. Thereafter, the volume was made up to 100 ml with buffer. Subsequently, the solution in the volumetric flask was filtered, and 1ml of the filtrate was diluted and analyzed at 265 nm using UV-visible spectrophotometer (Shimadzu UV-1800, Japan)

Kinetics of Drug Release:

Kinetics drug release was studied, in 900 ml phosphate buffer pH 7.2, maintained at 37±2°C for 6 h, at 100 rpm. 5ml of the sample was withdrawnafter a specified time interval and was replaced by an equal volume of fresh dissolution medium. 20 Collected samples were analysed spectrophotometrically at a measured wavelength of 265 nm, and cumulative percent drug release was calculated [10-11] The test was performed in triplicate to assure significance of results. Drug release profile was studied using percentage drug release Vs time (h) plot.the kinetic study was done F2batch,Various models such as Zero order kinetics (cumulative percentage amount of drug release versus time), First order kinetics (log cumulative percentage of drug.

Dissolution Test:

Dissolution of commercially available brands and formulated aspirin tabletswas measured by paddle method in dissolution apparatus (Erweka GmbH, Germany) using 0.05M acetate buffer solution 500 mL (pH 4.5) at 50 rpm, maintained at 37±0.5°C. After 30 minutes the absorbance of suitably dilutedportions in same medium was determined against absorbance of standard preparation at 265nm using UV-VIS Spectrophotometer (Shimadzu UV-150- 02 Double beam spectrophotometer .

Fig N0. 7 Dissolution test apparatus

Assay :

Twenty tablets were accurately weighed and then triturated in a mortar with pestle, amount equivalent to 100 mg of aspirin was transferred to a 50 mL volumetric flask, diluted by 20 mL of diluting solution (acetonitrile and formic acid

99:1). The volumetric flask was shaken manually, centrifuged at 3000 rpm for 5 minutes and then the stock prepared was diluted. An aliquot of the diluted solution was injected into a liquid chromatograph with a detector set at 280 nm. The responses were compared with the standard to determine the quantity in mg of aspirin present in the sample.

Result and discussion:

Preformulation study:

State: solid
Color: White powder
Odour: odorless
Melting Point:

Melting point:

The melting point determination gives idea about the purity of the compound. Melting point of drug was determined by using **'Thiele's tube'** apparatus. It is also known as capillary tube method. Small quantity of sample was inserted in a Thin-walled capillary having 10-15 cm long and about 1 mm inside diameter which was closed at one end. The substance whose melting point was to be determined was dried completely and filled it into a small and dry capillary tube, which was then sealed at one end. The capillary tube was then tied to a thermometer and introduced into the Thiele's tube. After that heating was started at the rate of increase in temperature of 3 _C per minute. Heating was continued until the substance filled in the capillary was melted. The thermometer reading was noted. For the assessment of accurate result the same procedure was fallowed in triplicate manner. Finally the average of these three melting point range are taken as the melting point of the drug.

Sr. No.	Melting point	Average Melting point range	Standard Melting point
1	190°c-191°c	190°c-192°c	189°c -193°c
2	191°c-192°c		
3	190°c-191°c		

Table No 2. Melting point of Favipiravir by capillary method

Table No. 3 Determination of flow properties of powder:

Batch	Bulk Density (gm/ml)	Tapped density (gm/ml)	Carr's index	Hausner's ratio	Angle of repose
F1	0.815	0.981	12.92	1.20	27.55
F2	0.841	0.856	10.22	1.11	28.50
F3	0.904	0.564	9.84	1.10	28.10

Evaluation of tablets

Table No. 4 Post evaluation of tablets

Formulations	Diameter	Thickness	Hardness	Friability
F1	1.33±0.0638	0.38±0.2541	4.74±1.2541	0.24
F2	1.34±0.0639	0.39±0.2499	4.67±1.1918	0.28
F3	1.34±0.0328	0.38±0.0850	4.90±1.7986	0.31

Table No. 5 Evaluation test of tablets

Formulations	Weight variation (gm)	Disintegration Time (sec)	Dissolution (%)	Assay
F1	0.40±0.0215	20	100.65	99.07
F2	0.39±0.0261	15	95.00	97.01
F3	0.40±0.0125	20	91.00	96.05

CONCLUSION:

In the present work, aspirin tablets using fewer excipients were manufactured successfully that fulfills all the pharmacopoeial limits. This type of study may also be done on other drugs to get a cost effective product. Further work using optimization technique is recommended for future studies using present data as a reference guide.

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