CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

SJIF Impact Factor: 7.187
https://doi.org/10.5281/zenodo.7544259

Available online at: http://www.iajps.com *Research Article*

FORMULATION, DEVELOPMENT AND EVALUATION OF FAST DISSOLVING ORAL FILM OF AMLODIPINE

Aaditya Kumar Upadhyay, Dr. Vivekanand Katare*[1], Ms. Sadhna Mangrole[1], Dr. Prabhat Kumar Jain[2]

[1]Vivekanand College of Pharmacy, Bhopal (M.P.), [2]Scan Research Laboratories, Bhopal (M.P.)

Article Received: December 2022 **Accepted:** December 2022 **Published:** January 2023

Abstract:

Fast dissolving films are a new arising oral dosage forms used by patient's world widely. These dosage forms can be used even in acute condition for getting instant relief. Fast dissolving films have gained vast attention on the market because of its various advantages along with an extended shelf life of 2-3 years. Amlodipine is commonly used in the treatment of high blood pressure and angina. Amlodipine has antioxidant properties and an ability to enhance the production of nitric oxide (NO), an important vasodilator that decreases blood pressure. The option for single daily dosing of amlodipine is an attractive feature of this drug. Amlodipine is used alone or together with other medicines to treat hypertension (high blood pressure). The aim of this study is to formulation, development & evaluation of fast dissolving oral film of Amlodipine. The film was formulated and tested for all parameters. The results showed that the formulated film was white in colour with no odour & bitter taste. It was freely soluble In methanol & chloroform, soluble in ethanol & phosphate buffers. Slightly soluble in 0.1 N HCL & 0.1 N NaOH The melting points of Amlodipine range were found to be 198-199°C. The pH of Amlodipine was found to be 6.64. The thickness & weight variation was found to be 0.161±0.05 & 23.27±0.05respectively. The folding endurance of film was more than 100. The disintegrating time was 5±0.2 sec. The % moisture content was 0.118. From the results it can be concluded that the formulated oral film have all ideal characteristics.

Keywords: *Fast dissolving, oral film, Amlodipine, Blood pressure.*

Corresponding author:

Vivekanand Katare,

Vivekanand College of Pharmacy, Bhopal (M.P.)

QR code

Please cite this article in press Vivekanand Katare et al, ***Formulation, Development And Evaluation Of Fast Dissolving Oral Film Of Amlodipine..,*** *Indo Am. J. P. Sci, 2023; 10(01).*

INTRODUCTION:

Fast dissolving films are a new arising oral dosage forms used by patients world widely. These dosage forms can be used even in acute condition for getting instant relief. Fast dissolving films have gained vast attention on the market because of its various advantages along with an extended shelf life of 2-3 years. These oral sublingual wafers are nothing but a thin oral strip which when place in the sublingual cavity dissolves immediately due to presence of saliva in the mouth by releasing medicament within short span of time. Sublingual films seem to be highly advantageous dosage form during travelling as it does not need water for engulfment. Films are administered sublingually to improve the onset of action, lower the dose and enhance efficacy of the medicament, it is more stable, durable and quicker dissolving than other conventional dosage forms, an oral films helps to enhance bioavailability of the drug, improves dosing accuracy i.e., single unit dosage form, has the potential to allow the use of bitter tasting drug into the formulation and improves patient compliance. Benign prostatic hyperplasia is a condition in which there is enlargement of prostate gland without malignancy. The bladder wall thickens and loses the ability to empty completely [1,2].

The name "fast dissolving" indicates that these dosage forms dissolves quickly and disintegrates into smaller particles by saliva and swallowed into the stomach. The time to reach from mouth to the stomach is estimated to be between 5 and 10 minutes. Hence fast dissolving drug delivery system has the advantage of liquid dosage form i.e. convenient drug administration. The fast passage of dissolved dosage form to the stomach provides a better opportunity for the medication to be absorbed through the membrane of the buccal cavity, pharynx and esophagus for improved bioavailability and quick onset of drug action [3.4].

Amlodipine is commonly used in the treatment of high blood pressure and angina. Amlodipine has antioxidant properties and an ability to enhance the production of nitric oxide (NO), an important vasodilator that decreases blood pressure. The option for single daily dosing of amlodipine is an attractive feature of this drug. Amlodipine is used alone or together with other medicines to treat hypertension (high blood pressure). High blood pressure adds to the workload of the heart and arteries. [5,6].

Amlodipine is considered a peripheral arterial vasodilator that exerts its action directly on vascular smooth muscle to lead to a reduction in peripheral vascular resistance, causing a decrease in blood pressure. Amlodipine is a dihydropyridine calcium antagonist (calcium ion antagonist or slow-channel blocker) that inhibits the influx of calcium ions into both vascular smooth muscle and cardiac muscle. Experimental studies imply that amlodipine binds to both dihydropyridine and non -dihydropyridine binding sites, located on cell membranes. The contraction of cardiac muscle and vascular smooth muscle are dependent on the movement of extracellular calcium ions into these cells by specific ion channels. Amlodipine blocks calcium ion influx across cell membranes with selectivity. A stronger effect of amlodipine is exerted on vascular smooth muscle cells than on cardiac muscle cells. Direct actions of amlodipine on vascular smooth muscle result in reduced blood pressure [7,8]. The present study deals with formulation & evaluation of Fast Dissolving Oral Film of Amlodipine.

MATERIAL AND METHODS:

Amlodipine were obtained as pure sample from Pharmaceutical Industries. HPMC K15M, PEG-400, SSG, CCS was obtained from Mapromax, Life sciences Pvt. Ltd. Dehradun. Aspartame, citric acid was obtained from Loba Chemical Pvt Ltd (Mumbai, India). Hydrochloric acid was obtained from S. D. Fine Chem. Ltd., Mumbai. All other chemical were purchased from Hi Media, Mumbai. Double distilled water was prepared freshly and used whenever required. All other chemicals used in this study including those stated were of analytical reagent (A.R.) grade.

Organoleptic evaluation:

It refers to the evaluation by sensory characters-taste, appearance, odor etc.

Solubility (at room temp :) Solubility is determined in different solvents example – water methanol, 0.1 N HCl, ethyl alcohol, and chloroform (Indian Pharmacopoeia, 2007).

Melting point:

It is one of the parameters for the purity of drugs. In case of pure chemicals, melting points are very sharp and constant. Since the drugs contain the mixed chemicals, they are described with certain range of melting point.

pH is a measurement:

pH is a measurement of how acidic or basic a solution is. pH is measured on a scale of 0-14. Solutions with a pH less than 7 are said to be "acidic", solutions with a pH greater than 7 are "basic" or "alkaline", and a pH of 7 is "neutral". pH is really a measure of the relative amount of free hydrogen and hydroxyl ions in the water.

Determination of λ_{max}:
The absorption maxima of Amlodipine were determined by running the spectrum of drug solution in double beam ultraviolet spectrophotometer.

Preparation of oral films:
Amlodipine containing fast dissolving films were fabricated by the solvent casting method. The optimized amount of HPMC was dissolved in 5mL of water and stirrer continuously for 1 hour, optimized amount of Plasticizer and drug were dissolved in 95 % ethanol and then added to the polymeric solution, Polymeric solution was stirred for 30 min using magnetic stirrer and was kept in undisturbed condition till the entrapped air bubbles were removed. The aqueous solution was casted in a glass moulds having 2.5 x 2.5 cm, 10 films area and was dried at controlled room temperature (25-30°C, 45 % RH) as well as at increased temperature (microwave oven). The film took approximately 48 hr to dry at controlled room temperature. The dried film was carefully removed from the glass plates and was cut into size required.

Table 1: Formulation of Amlodipine oral fast dissolving films

Name of ingredients	Quantity(mg)
Amlodipine	120mg
Carbopol	250mg
HPMC	25mg
SSG	20mg
CP	20mg
Aspartame	20 mg
Citric acid	10 mg
Distilled water	qs (ml)

Evaluation of oral fast dissolving films:
The formulations were evaluated by the following tests.

Thickness:
Randomly 10 films were selected and thickness was measured using vernier calliper at three different places.

Weight variation:
For each formulation, three randomly selected patches were used. For weight variation test, 10 films from each batch were weighed individually by digital electronic balance and the average weight was calculated.

Drug content analysis:
The patches (n = 3) of specified area were taken into a 10 ml volumetric flask and dissolved in methanol and volume was made up with 10 ml methanol. Subsequent dilutions were made and analyzed by UV spectrophotometer.

Folding endurance:
This was determined by repeatedly folding one film at the same place until it broke. The number of times the film could be folded at the same place without breaking cracking gave the value of folding endurance.

Percentage of moisture content:
The films were weighed individually and kept in desiccators containing activated silica at room temperature for 24 hrs. Individual films were weighed repeatedly until they showed a constant weight. The percentage of moisture content was calculated as the difference between initial and final weight.

***In vitro* disintegration study:**
The film of (4.15cm2) size (unit dose) was placed on a petridish containing 10 ml of distilled water. The time required for the film to break was noted as cursive in vitro disintegration time.

Measurement of mechanical properties:
Microprocessor based advanced force gauge tensiometer (DS 2 series) equipped with a 50 kg load cell was used to determine the mechanical properties of OFDFs. Film of 60x10 mm2 was fixed between two clamps separated by a distance of 3 cm17. The lower clamp was held stationary and the strips were pulled apart by the upper clamp moving at a rate of 2 mm/sec until the strip broke. The force and elongation of the film at the point when the strip broke was recorded. The tensile strength and percent elongation values were calculated

RESULTS & DISCUSSION:

The formulated film was white in colour with no odour & bitter taste. It was freely soluble In methanol & chloroform, soluble in ethanol & phosphate

buffers. Slightly soluble in 0.1 N HCL & 0.1 N NaOH The melting points of Amlodipine range were found to be 198-199°C. The pH of Amlodipine was found to be 6.64. The thickness & weight variation was found to be 0.161±0.05 & 23.27±0.05respectively. The folding endurance of film was more than 100. The disintegrating time was 5±0.2 sec. The % moisture content was 0.118.

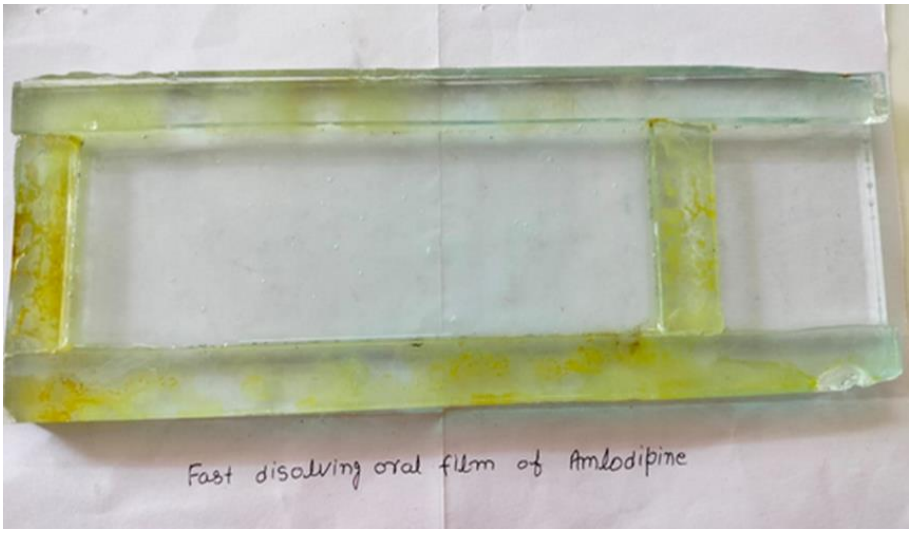

Table 2: Organoleptic property of Amlodipine

Color	White powder
Odor	Odorless
Taste	Bitter

Table 3: Solubility studies of Amlodipine in different solvent

S. No.	Solvent used	Solubility
1.	Water	Soluble
2.	0.1 N HCl	Slightly soluble
3.	Ethanol	Soluble
4.	Methanol	Freely soluble
5.	0.1 N NaOH	Slightly soluble
6.	Chloroform	Freely soluble
7.	Phosphate buffer 6.8 pH	Soluble

Results of evaluation of film:

Table 4: Result of thickness and weight variation

Formulation	General Appearance	Weight(mg) Mean ± S.D	% Assay
Film	Translucent	0.161±0.05	23.27±0.05

Table 5: Result of folding endurance, disintegrating time, tensile strength, % elongation &% of moisture content

Formulation	Folding endurance (Times)	Disintegrating time (Sec)	% of moisture content
Film	More then 100	5±0.2	0.118

CONCLUSION:

From present investigation it can be concluded that oral fast dissolving films are superior in drug release. The films prepared had shown good mechanical strength, drug release, disintegration time and stability. Percent drug release and disintegration time was taken as responses for study which were found within the accepted ranges. As the concentration of SSG was increased, both the disintegration and the drug release rates increased. Amlodipine

administered in the form of fast dissolving films will be potential novel drug dosage form for pediatric, geriatric and also for general population by providing faster release and better patient compliance.

REFERENCES:

1. Pather SI, Khankari R, Siebert J. Quick-Dissolving Intraoral Tablets. Drugs and Pharmaceutical sciences, vol. 145, Drug delivery to oral cavity- Molecules to market, p. 291-309.
2. Mahajan A, Chhabra N, Aggarwal G. Formulation and Characterization of Fast Dissolving Buccal Films: A Review. Scholars Research Library, Der Pharmacia Lettre 2011; 3(1):152-65.
3. Sharma K, Ghosh TK, Pfister WR. Quick-Dispersing Oral Drug Delivery Systems. Drugs and Pharmaceutical sciences, vol. 145, Drug delivery to oral cavity- Molecules to market, p. 261-87.
4. Patel R. Design of a Novel Rapidly Dissolving Wafer System for Oromucosal Drug Delivery. September 2003; 21-5.
5. Murdoch D, Heel RC. Amlodipine. Drugs. 1991 Mar;41(3):478-505.
6. Shelke PV, Dumbare AS, Gadhave MV, Jadhav SL, Sonawane AA, Gaikwad DD. Formulation and evaluation of rapidly dis integrating film of amlodipine bes ylate. Journal of Drug Delivery and Therapeutics. 2012 Mar 13;2(2).
7. Maheswari KM, Devineni PK, Deekonda S, Shaik S, Uppala NP, Nalluri BN. Development and evaluation of mouth dissolving films of amlodipine besylate for enhanced therapeutic efficacy. Journal of pharmaceutics. 2014;2014.
8. Sabar MH. Formulation and in-vitro evaluation of fast dissolving film containing amlodipine besylate solid dispersion. Int J Pharm Pharm Sci. 2013;5(4):419-28.