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Research Article

Development of Fast Dissolving Oral Films Containing Vitamin B6 for Nausea and Vomiting of Pregnancy (NVP)

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ABSTRACT

The aim of this study was to formulate and evaluate the oral fast-dissolving film of Vitamin B6 for the effective management of motion sickness and vomiting during pregnancy. Fast-dissolving films were prepared by the solvent-casting method using different polymers, HPMC-15 and Pullulan, along with Propylene glycol as a plasticizer. The Fourier-transform infrared study for the drug-polymer interaction was carried out. Evaluation of physical parameters such as physical appearance, surface texture, uniformity of weight, uniformity of strip thickness, surface pH, folding endurance, uniformity of drug content and percentage of moisture absorption were performed. Kinetic data analysis for the release study and the stability study were also performed. Results of uniformity of weight, thickness, folding endurance, surface pH, percentage drug content, tensile strength and percentage elongation of all the films were found to be satisfactory. The Fourier-transform infrared study indicated that there was no interaction between the drug and the polymers. The *in-vitro* drug release study showed that a better rate of drug release was achieved by formulations F4 and F8 compared with other formulations. The stability study did not show any significant difference in the external appearance, the drug content and the *in-vitro* drug release. In conclusion present study suggested that fast dissolving films has a better ability to cross the sublingual barrier at a faster rate, and hence the delivery system was found to be promising as it has the potential of overcoming the drawbacks associated with tablet formulations available in the market presently.

Keywords: Fast-dissolving film, Vitamin B6, HPMC-15, Pullulan gum, Mango peel pectin, Crospovidone, solvent casting**Article Info:** Received 11 March 2019; Review Completed 20 April 2019; Accepted 23 April 2019; Available online 15 May 2019

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INTRODUCTION

Oral route is the most preferred route for the delivery of the drugs till date as it bears various advantages over the other route of drug administration, but oral drug delivery systems still need some advancements to be made because of their some drawbacks related to particular class of patients which includes geriatric, pediatric and dysphasic patients associated with many medical conditions as they have difficulty in swallowing or chewing solid dosage forms. Many pediatric and geriatric patients are unwilling to take solid preparations due to fear of choking.¹ Even with fast dissolving tablets there is a fear of choking due to its tablet type appearance. One study showed that 26% of 1576 patients experienced difficulty in swallowing tablets. The most common complaint was tablet size, followed by surface form and taste. The problem of swallowing tablets was more evident in geriatric and pediatric patients, as well as travelling patients who may not have ready access to water.²

So, fast-dissolving drug-delivery systems came into existence in the late 1970's as an alternative to tablets, capsules and

syrops for pediatric and geriatric patients who experience difficulties in swallowing traditional oral solid-dosage forms. These systems consist of the solid dosage forms that disintegrate and dissolve quickly in the oral cavity without the administration of water. Research and development in the oral drug delivery segment has led to transition of dosage forms from simple conventional tablets or capsules to modified release tablets or capsules to oral disintegrating tablet (ODT) to wafer to the recent development of oral fast dissolving films (OFDFs). Amongst the plethora of avenues explored for the rapid drug releasing products, oral strip technology is gaining much attention.³

MATERIALS AND METHODS

Preparation of mouth dissolving oral film by direct solvent casting method

Formulation of fast-dissolving films⁴

In the present study, fast-dissolving films of Vitamin B6 were prepared by a solvent casting technique. Flat, square-shaped,

aluminum foil-coated glass molds having a surface area of 25 cm² were fabricated for casting the films.

Preparation of casting solutions

The weighed quantities of polymers were kept for swelling overnight in distilled water and dissolved (heated, if necessary). The drug, superdisintegrants and aspartame were dissolved in distilled water and added to the above mentioned polymer solution along with propylene glycol as a plasticizer, mixed thoroughly to form a homogenous mixture. The volume was made up to 10 ml with distilled water. Entrapped air bubbles were removed by applying vacuum.

Preparation of fast-dissolving films⁵

The casting solution (10 ml) was poured into glass molds and dried at 40°C in a vacuum oven for 24 hour for solvent evaporation. The patches were removed by peeling and cut into a square dimension of 5 cm × 5 cm (25cm²). These patches were kept in a desiccator for 2 days for further drying and wrapped in aluminium foil, and packed in self-sealing covers. Fast-dissolving films were prepared with different polymers and ratios by maintaining the concentration of the plasticizer and sweetener constant

Table 1.

Table 1: Formulation development of Vitamin B6 fast dissolving oral film by solvent casting method

Formula code	F1	F2	F3	F4	F5	F6	F7	F8
Vitamin B6 (mg)	50	50	50	50	50	50	50	50
Crospovidone (mg)	10	20	--	--	10	20	--	--
Mango peel pectin (mg)	--	--	10	20	--	--	10	20
HPMC-15 (mg)	--	--	--	--	60	60	60	60
Pullulan gum (mg)	60	60	60	60	--	--	--	--
Propylene glycol (ml)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Aspartame (mg)	20	20	20	20	20	20	20	20
Menthol (mg)	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S	Q.S
Water up to (ml)	10	10	10	10	10	10	10	10

Pre-Formulation Studies

Preformulation testing is the first step in the rational development of dosage forms of a drug substance. It can be defined as an investigation of physical and chemical properties of a drug substance alone and when combined with excipients. The overall objective of pre-formulation testing is to generate information useful to the formulator in developing stable and bioavailable dosage forms which can be mass produced.

Analytical Method used in the Determination of Vitamin B6

Identification of pure drug:

Identification of Vitamin B6 was carried out by Infra-Red Absorption Spectrophotometer.

Determination of $\lambda_{\max}$:

From above mentioned standard stock solution, 0.4 ml was withdrawn and added to the 10 ml volumetric flask and diluted up to 10 ml with 0.1N HCl. Finally, sample was scanned in the range of 200-400 nm. UV spectrum was recorded and absorption maximum was found to be 292 nm which is shown in **Fig 13** in **chapter 5**, and was used for the further analytical studies.

Standard calibration curve of Vitamin B6 in 0.1N HCl.⁹

From the stock solution 0.2, 0.4, 0.6, 0.8 and 1.0 ml solution was withdrawn and added in to 10 ml volumetric flask and finally diluted up to 10 ml with 0.1N HCl to get the solution with concentration of 2-10 µg/ml respectively. The absorbance was measured for each solution at 292 nm using UV-visible spectrophotometer. The graph was plotted for absorbance vs concentration.

Compatibility study:

Weighed amount of drug (3 mg) was mixed with 100mg of potassium bromide (dried at 40-50°C). The mixture was taken and compressed under 10-ton pressure in a hydraulic press to form a transparent pellet. The pellet was scanned by

IR spectrophotometer. Similar procedure is followed for all relevant excipients used.¹⁰

Evaluation of fast-dissolving films^{6,7,8}

Mass uniformity and thickness:

Three randomly selected different films from each batch (2×2 cm²) were weighed individually on an electronic balance. The average weight of the films was calculated. The thickness of the films was measured by vernier caliper at three different positions on the film and the average was calculated.

Drug content uniformity:

A fast-dissolving film (25 cm²) was transferred into a graduated flask containing 100 ml of distilled water. The flask was shaken for 4 hour in a mechanical shaker. The solution was filtered and after suitable dilutions with distilled water, the absorbance value was measured at 292 nm using the placebo patch (patch without drug) solution as a blank, and the drug content was calculated.

Folding endurance:

The folding endurance is expressed as the number of folds (number of times the film is folded at the same place) required to break the specimen or to develop visible cracks. This also gives an indication of brittleness of the film. A strip of 2.5 cm × 2.5 cm (6.25 cm²) was subjected to folding endurance by folding the patch at the same place repeatedly several times until a visible crack was observed, and the values were reported.

Surface pH:

The film to be tested was placed in a Petri dish and was moistened with 0.5 ml of distilled water and kept for 30 sec. The pH was noted after bringing the electrode of the pH meter in contact with the surface of the formulation and allowing equilibration for 1 min. The average of three determinations for each formulation was done.

Elongation and tensile strength:

This mechanical property was evaluated using the Instron universal testing instrument with a 5kg load cell. Film strips in a special dimension and free from air bubbles or physical imperfections were held between two clamps positioned at a distance of 3 cm. During measurement, the strips were pulled by the top clamps at a rate of 100 mm/min; the force and elongation were measured when the film broke. Results from film samples, which broke at and not between the clamps, were not included in the calculations. Measurements were run in triplicate for each film. Two mechanical properties, namely, tensile strength and percentage elongation were computed for the evaluation of the film. Tensile strength is the maximum stress applied to a point at which the film specimen breaks and can be computed from the applied load at rupture.

Disintegration test:

Disintegration test was performed to ensure the disintegration of the film in water. One film from each formulation was introduced into one tube of disintegration apparatus IP. A disc was added into the tube. The assembly was suspended in a beaker containing simulated saliva and the apparatus was operated until the film disintegrated.

In-vitro dissolution studies:¹¹

The simulated salivary fluid was taken as the dissolution medium to determine the drug release.

The dissolution profile of quick release films of Vitamin B6 was carried out in a beaker containing 30 ml of the simulated salivary fluid (pH 6.8) as a dissolution medium, maintained at $37 \pm 0.5^\circ\text{C}$. The medium was stirred at 100 rpm. Aliquots (5 ml) of the dissolution medium were withdrawn at 2, 4, 8, 12 and 15 minute time intervals and the same amount was replaced with the fresh medium. Samples were assayed spectrophotometrically at 292 nm. Three trials were carried out for all the samples and the average value was taken. The percentage of the drug dissolved at various time intervals was calculated and plotted against time.

Mathematical modelling of drug release profile:¹²

The cumulative amount of Vitamin B6 release from the formulated tablets at different time intervals were fitted to zero order kinetics, first order kinetics, Higuchi's model and korsmeyer-peppas model to characterize mechanism of drug release.

Zero Order Kinetics

It describes the system in which the release rate is independent of its concentration.

$$Q_t = Q_0 + K_0 t$$

Where, Q_t = amount of drug dissolved in time t , Q_0 = initial amount of drug in the solution

K_0 = zero order release constant

If the zero order drug release kinetic is obeyed, a plot of Q_t versus t will give straight line with a slope of K_0 and an intercept at Q_0 .

First Order Kinetic:

It describes the drug release from the system in which the release rate is concentration dependant.⁵⁶

$$\log Q_t = \log Q_0 + K_1 t / 2.303$$

Where, Q_t = amount of drug dissolved in time

Q_0 = initial amount of drug in the solution

K_1 = first order release constant

If the release pattern of drug follows first order kinetics, then a plot of $\log (Q_0 - Q_t)$ versus t will be straight line with a slope of $K_1/2.303$ and an intercept at $t = 0$ of $\log Q_0$.

Higuchi Model

It describes the fraction of drug release from a matrix is proportional to square root of time.

$$M_t / M_\infty = K_H t^{1/2}$$

Where, M_t and M_∞ are cumulative amount of drug release at time t and infinite time, and

K_H = Higuchi dissolution constant reflection formulation characteristics.

If the Higuchi model of drug release is obeyed, then a plot of M_t / M_∞ versus $t^{1/2}$ will be straight line with slope of K_H .

Korsmeyer- Peppas Model

The power law describes the fractional drug release is exponentially related to the release time and adequately describes the release of drug from slabs, cylinders and spheres, as expressed in following equation.

$$M_t / M_\infty = K t^n$$

$$\log (M_t / M_\infty) = \log K + n \log t$$

Stability Studies¹³

Stability can be defined as the capacity of drug product to remain within specifications established to ensure its identity, strength, quality, and purity.

Importance of stability studies

Stability studies are important for the following reasons.

1. This is an assurance given by the manufacturer that the patient would receive a uniform dose throughout the shelf life.
2. The drug control administration insists on manufacturers on conducting the stability studies, identity, strength, purity and quality of the drug for an extended period of time in the conditions of normal storage.
3. Stability testing prevents the possibility of marketing an unstable product. Both physical and chemical degradation of drug can result in unstable product.

The optimized formulation was subjected for two months stability study according to ICH guidelines. The selected formulations were packed in aluminium foil in tightly closed container. They were then stored at 40°C / 75% RH for two months and evaluated for their permeation study.

RESULTS AND DISCUSSION

Standard graph of Vitamin B6

λ_{max} of Vitamin B6 was found to be 292 nm as it shows maximum absorbance in this wavelength.

5.3 Calibration curve of Vitamin B6

The absorbance was measured in a UV spectrophotometer at 292 nm against 0.1N HCl. The absorbance so obtained was plotted and shown in the **Figure 1**.

Figure 1: Calibration Curve of Vitamin B6 in 0.1N HCl

Compatibility studies using FTIR

Infra-red spectrum of drug and polymers were recorded over KBr disc method and obtained spectra were shown in the **Figure 2-6**.

All the characteristic peaks of Vitamin B6 were present in the spectrum of drug and polymer mixture, indicating compatibility between drug and polymer. The spectrum confirmed that there is no significant change in the chemical integrity of the drug. There is no change in functional group peaks (C=O, C=N, C-S, C-N, S=O, C-Cl) of Vitamin B6 in all the IR-spectra.

Figure 2: FT-IR spectrum of pure drug (Vitamin B6)

Figure 3: FT-IR of formulation F1

Figure 4: FT-IR spectrum of formulation F3

Figure 5: FT-IR spectrum of formulation F5

Figure 6: FT-IR Spectrum of formulation F7

Preparation of film formulations:

Fast-dissolving films of Vitamin B6 were prepared by the solvent casting method on glass molds, using Pullulan gum and HPMC-15 as polymers. Propylene glycol was used as a plasticizer and aspartame as a sweetener. Distilled water was used as a solvent for HPMC and Pullulan gum. Mango peel pectin and crospovidone was used as superdisintegrants. The effect of the concentration ratio of polymers and superdisintegrants was studied by preparing various formulations of fast-dissolving films. In the preparation, the addition of ingredients, particularly propylene glycol and aspartame, was followed after the careful evaluation of films for physical characteristics. In all these formulations, a constant amount of drug (50 mg) was maintained. The casting solution (10 ml) was poured into 25 cm² molds, so that each square centimetre contains approximately 2 mg of the drug. The concentration of polymers and the concentration of other ingredients such as plasticizer and sweetener were kept constant. A total number of eight formulations were prepared.

Evaluation of Vitamin B6 fast dissolving oral film:

Mass uniformity, thickness and appearance:

From the results of the tests for physical characterization conducted, it is observed that the weight and thickness of all film samples was uniform within each formulation. The thickness of 12 films of each formulation was determined using a micrometer screw gauge, and the average thickness

was determined. The values were found to be in the range of 120–210 μ m, which is said to be acceptable for fast-dissolving films. The films with HPMC as a polymer showed a slightly increase in thickness which might be due to increased viscosity of HPMC. Physical appearance of prepared film was checked simply with visual infection of films and by feel or touch. Films formulated from Pullulan gum were smooth, flexible and transparent whereas those prepared from HPMC-15 were slightly rough in texture, less flexible and translucent. The results were showed in **Table 3**.

Drug content uniformity:

The drug content estimation was done using by UV spectrophotometer (Shimadzu UV-1800), at 292nm. Drug content of all the formulations were found between 96.81 to 99.07 %. All the film formulations of Vitamin B6 showed uniform drug content as shown in **Table 3**.

Folding endurance:

The result of folding endurance is shown in **Table 3**. Folding endurance of fast dissolving film was found in the range 250 $\pm$ 3 to 454 $\pm$ 3. Fast dissolving film containing Pullulan gum as polymer showed optimum folding endurance (more than 400 $\pm$ 2) compared to formulations containing HPMC-12. Therefore on the basis of appearance and folding endurance, we can say that Pullulan gum based formulations were superior to HPMC-12 based formulations.

Table 3: Evaluation of mouth dissolving film of Vitamin B6

Formulation	Mass uniformity (mg)	Thickness (μm)	Appearance	Drug content	Folding endurance
F1	89	110 $\pm$ 3.5	Transparent	98.81 $\pm$ 0.002	>400
F2	94	135 $\pm$ 05	Transparent	98.71 $\pm$ 0.022	>400
F3	87	210 $\pm$ 05	Transparent	97.76 $\pm$ 0.021	>400
F4	98	195 $\pm$ 4.5	Transparent	99.07 $\pm$ 0.015	>400
F5	89	160 $\pm$ 05	Translucent	98.81 $\pm$ 0.003	<300
F6	88	165 $\pm$ 03	Translucent	96.81 $\pm$ 0.032	<300
F7	95	184 $\pm$ 2.5	Translucent	98.46 $\pm$ 0.042	<300
F8	103	197 $\pm$ 04	Translucent	98.68 $\pm$ 0.013	<300

Surface pH:

An acidic or alkaline pH of administered dosage forms can irritate the buccal mucosa. The surface pH of the prepared fast dissolving film was found in the range of 6.7 $\pm$ 0.3 to 7.02 $\pm$ 0.3. The measured surface pH was found to be close to neutral in all the formulations which means that they have less potential to irritate the buccal mucosa and therefore they should be fairly comfortable and hence, more acceptable by the patients.

Elongation and tensile strength:

The tensile strength gives an indication of the strength and the elasticity of the film reflected by the parameters tensile strength and elongation at break. A weak and soft polymer is

characterized by low tensile strength and elongation at break, a hard and brittle polymer shows a moderate tensile strength and low elongation at break and a soft and tough polymer shows a high tensile strength and elongation at break. In this study, the effect of superdisintegrants to polymer ratio was observed. The percentage elongation increased with the decrease in the percentage of superdisintegrant to polymer ratio. Among the formulation batches, HPMC based films showed a better tensile strength due to the hydrophobic nature of the polymers compared to Pullulan gum. The percentage elongation of prepared film was found in the range of 36.88 $\pm$ 1.3% to 72.15 $\pm$ 1.4% and Tensile strength was found in the range of 1.28 $\pm$ 0.06 kg/mm² to 1.41 $\pm$ 0.017 kg/mm². Results of tensile strength and percentage elongation are shown in **Table 4**.

Table 4: Evaluation of mouth dissolving film of Vitamin B6

Formulation	Surface pH	Tensile strength Kg/mm ²	% Elongation	Disintegration time (sec)
F1	6.70 $\pm$ 0.3	1.28 $\pm$ 0.006	36.88 $\pm$ 1.30	72
F2	6.92 $\pm$ 0.3	1.31 $\pm$ 0.016	43.75 $\pm$ 1.74	44
F3	6.80 $\pm$ 0.3	1.29 $\pm$ 0.022	55.86 $\pm$ 1.55	49
F4	7.02 $\pm$ 0.3	1.32 $\pm$ 0.054	47.11 $\pm$ 1.63	33
F5	6.72 $\pm$ 0.3	1.40 $\pm$ 0.015	72.15 $\pm$ 1.40	51
F6	6.94 $\pm$ 0.3	1.36 $\pm$ 0.047	65.88 $\pm$ 1.34	47
F7	7.01 $\pm$ 0.3	1.37 $\pm$ 0.018	69.05 $\pm$ 1.52	54
F8	6.85 $\pm$ 0.3	1.39 $\pm$ 0.024	58.19 $\pm$ 1.54	38

Disintegration test:

The disintegration time of prepared fast dissolving film was ranging between 33 second to 72 second and results shown in **Table 4**. Disintegration time of the films was decreased when the concentration of superdisintegrants were increased. Among the superdisintegrants used, formulation F4 containing 1:3 ratio of Mango peel pectin and Pullulan gum showed rapid disintegration i.e. 33 second. Fast disintegration time of formulation F4 might be due to higher swelling index of Mango peel pectin.

In-vitro dissolution studies:

From the *in-vitro* drug release, it was observed that formulations F4 containing Pullulan gum in combination with higher concentration of Mango peel pectin as a

superdisintegrant showed faster drug release, and among the HPMC based films, formulation batch F8 showed more than 90% of drug release with in 15 minute. The release of the drug from prepared film was dependent on concentration of superdisintegrants used, when the concentration of superdisintegrants is increased, drug release from formulation was also increased, and this might be due to faster disintegration time for these formulations. The drug release was found to be in the following order: F4 > F8 > F6 > F2 > F3 > F7 > F5 > F1. The release profile of fast-dissolving films was compared with that of conventional marketed product and it was observed that the drug release from fast-dissolving films was much faster than that from formulation. Results of *in-vitro* drug release studies were showed in **Table 5** and **Figure 7**.

Table 5: *In-vitro* drug release studies of Vitamin B6 fast dissolving films

Time in mins	% cumulative drug release								
	Formulation code								
	F1	F2	F3	F4	F5	F6	F7	F8	Marketed product
0	0	0	0	0	0	0	0	0	0
2	14.26	17.04	15.56	33.34	16.02	18.63	16.56	28.45	8.32
4	29.08	39.17	34.08	57.94	26.95	42.05	30.19	54.19	19.44
8	41.79	47.12	46.94	74.59	43.79	58.89	44.28	67.01	28.57
12	54.67	68.14	66.57	85.26	55.16	70.64	57.16	74.46	41.84
15	65.91	83.59	80.17	98.81	72.37	92.38	76.10	95.10	59.88

Figure 7: *In-vitro* drug release studies of Vitamin B6 fast dissolving films**Drug Release Kinetics:**

Investigation of the drug release from the fast dissolving film was done by plotting the data of *in-vitro* release studies into different kinetic equations (Zero order, First order, and Higuchi's equation). The release mechanism was understood by fitting the data to Korsmeyer Peppas model. The results of different release kinetics pattern and release mechanism of the drug from the different fast dissolving film formulations were showed in **Table 6**.

From the kinetic studies, **Table 6** the examination of correlation coefficient 'r' indicated that the drug release

followed first order kinetics. It was found that the value of 'r' for first order ranged from 0.989-0.998, which is near to 1 when compare to zero order (0.761-0.893) and Higuchi square root (0.598-0.796). So, it was understood to be following first order release pattern by the prepared film. In the present investigation, release from the hydrophilic polymers followed the combination of diffusion and erosion as the 'n' values ranged from 0.465 to 0.625 as per the Korsmeyer and Peppas model, which in turn justified the suitability of polymers for the preparation of fast-dissolving films. A result of release kinetics studies is showed in **Table 6**.

Table 6: Release exponent values and release rate constant values for different fast dissolving film formulations

Formula Code	Korsmeyer and Peppas		Higuchi	First Order	Zero Order
	R ²	N	R ²	R ²	R ²
F1	0.850	0.465	0.674	0.987	0.828
F2	0.842	0.559	0.598	0.990	0.892
F3	0.846	0.547	0.688	0.998	0.844
F4	0.825	0.625	0.686	0.984	0.761
F5	0.823	0.535	0.795	0.992	0.807
F6	0.835	0.486	0.693	0.984	0.893
F7	0.840	0.496	0.792	0.985	0.838
F8	0.835	0.545	0.796	0.989	0.847

R²=Regression coefficient, n= Exponential value

Stability studies:

Based on the results of *in-vitro* release studies, formulation F4 and F8 were selected for short term stability study. Stability studies were carried out for 90 days at 45-50°C (75% RH) and 25-30°C (60% RH). The films were observed

for physical changes, the percentage drug content and the percentage drug release. Fast-dissolving films of Vitamin B6 were found to be physically and chemically stable and showed no significant change in terms of physical characteristics, the percentage drug content and the percentage drug release.

Table 7: Results of short term stability of formulation F4 and F5 at 40°-50°C/75%RH

Times in (Days)	F4 Formulation		F8 Formulation	
	Drug content	% CDR	Drug content	% CDR
Initial	99.07	98.81	98.68	95.10
15	99.04	98.80	98.61	95.00
30	99.01	98.74	98.54	94.98
45	98.89	98.70	98.47	94.95
60	98.86	98.52	98.44	94.87
90	98.82	98.21	98.42	94.84

Table 8: Results of short term stability of formulation F4 and F5 at 25°-30°C/60%RH

Times in (Days)	F4 Formulation		F8 Formulation	
	Drug content	% CDR	Drug content	% CDR
Initial	99.07	98.81	98.68	95.10
15	99.07	98.81	98.67	95.10
30	99.05	98.78	98.63	94.99
45	99.04	98.74	98.60	94.96
60	98.98	98.70	98.56	94.93
90	98.93	98.65	98.52	94.90

CONCLUSION

Oral drug delivery is currently the golden standard in the pharmaceutical industry where it is regarded as the safest, most convenient and an economical method of drug delivery having the highest patient compliance.

The most popular dosage forms being tablets and capsules, one important drawback of these dosage forms however is the difficulty to swallow. Dysphagia or difficult in swallowing is seen to affect nearly 35% of the population. This disorder is also associated with number of medical conditions. Many elder persons will have difficulty in taking conventional dosage forms. However, geriatric, pediatric and mentally ill patients experience difficulty in swallowing conventional tablets, which leads to poor patient compliance. In some cases such as motion sickness, sudden episode of allergic attack or coughing and unavailability of water for swallowing tablets may become difficult.

To overcome this hurdles, scientists have developed innovative drug delivery systems known as fast dissolving dosage form. United States Food and drug administration (FDA) defined fast dissolving oral film is defined as "an ultra-thin film containing active ingredient that dissolves or disintegrates in the saliva at a remarkably fast rate, within few seconds without the aid of water or chewing". The faster the drug is going in to solution, the quicker the absorption and onset of clinical effect. Some drugs, which are soluble in saliva rapidly, absorbed from the mouth, pharynx and Oesophagus as the saliva passes down into the stomach thus avoids first pass metabolism and enhances the bioavailability.

For the present study, we have selected Vitamin B6 supplements have been used for years by conventional physicians as a treatment for morning sickness.

The main aim of this work is to prepare and evaluate of fast dissolving film of Vitamin B6 using superdisintegrants like Croscopovidone and Mango peel pectin and HPMC-15 and Pullulan gum as polymer. Eight formulations of fast dissolving film of Vitamin B6 were prepared by solvent casting method and subjected to various evaluation tests.

All the fast dissolving films were evaluated for compatibility, thickness, folding endurance, tensile strength, disintegration time and *in-vitro* drug release studies. Further the fast dissolving film formulations were subjected to their short term stability studies for three months and again subjected to further evaluation tests.

Results revealed that all the formulated films showed acceptable thickness, percentage elongation, and physical properties. *In-vitro* release studies revealed that, the drug released by F4 formulation was comparatively higher release than the other formulations. The formulation F4 shows 98.81% of drug release at the end of 15 min. To analyze the drug release mechanism from the fast dissolving film, the *in-vitro* drug release data was fitted to Zero order, First order, Higuchi's model equation and Korsmeyer-Peppas model. It was observed that the release of drug followed First order release kinetics and 'n' value indicates that release mechanism follows non-Fickian.

Thus, it can be summarized that stable Vitamin B6 fast dissolving film were prepared successfully by using superdisintegrants in different ratio by solvent casting technique. The prepared fast dissolving films disintegrates in matter of seconds without need of water and enhances the absorption, this leads to increase in the bioavailability of method to enhance the dissolution rate.

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