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# FORMULATION AND *IN-VITRO* CHARACTERIZATION OF OSELTAMIVIR FAST DISSOLVING TABLETS USING SUPER DISINTEGRANTS

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## ABSTRACT

The aim of the present study was to formulate fast dissolving tablet of Oseltamivir using Superdisintegrants with the help of solid dispersion technique to improve the aqueous solubility, dissolution rate and to facilitate faster onset of action. Solid dispersion of Oseltamivir was prepared with PVP K30 in different drug: carrier ratio using solvent evaporation methods. The optimized solid dispersion (drug: PVP K30, 1:0.5 ratio) were further used to prepare fast dissolving tablet by direct compression method using superdisintegrants such as Crospovidone and Xanthan gum. Infrared spectroscopy, differential scanning Calorimetry and X-ray Diffraction were performed to identify the physicochemical interaction between drug and optimized formulation. The pre-compression parameter of prepared powder blends all formulation suggested good flowability and compressibility. The prepared tablets were evaluated for thickness, hardness, friability, and weight variation, drug content, wetting time, disintegration time and *In vitro* dissolution studies. The batch F4- shows highest release of 99.82 % in 30min.

## KEYWORDS

Oseltamivir, Crospovidone, Xanthan gum, PVP K30 and *In-vitro* dissolution etc.

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## INTRODUCTON

Tablet is defined as compressed solid dosage form containing medicament with or without excipients. In recent decades, a diffusion of pharmaceutical analysis has been conducted to develop new indefinite quantity forms. The novel drug delivery systems is to increase safety and efficacy of drug by formulating convenient dosage form and to achieve better patient compliance[1]. The matter of swallowing is also a standard development throughout a geriatric patient because of worry of choking, hand tremors, dysphasia and in young

people because of underdeveloped muscular and nervous systems this results in a poor patient compliance which may be improved by the fast dissolving tablets[2]. The ideal drug delivery systems have 2 things would be needed 1st it might be one dose the period of treatment whether or not it's for days or week, like infection, or for the life time of the patient, as in high blood pressure or diabetes. Fast dissolving tablets are also called as mouth-dissolving tablets, melt-in mouth tablets, Oral dispersible tablets, rap melts, porous tablets, quick dissolving tablet. Fast dissolving tablets dissolve in the oral cavity without water. Most fast dissolving tablets has substances to mask the bitter taste of the active ingredient[3].

Oseltamivir is administered orally, it is an antiviral drug for the management of influenza A and B infections in children >1 year and adults of all ages[4]. Standard dose of oseltamivir in adult's is75mg, while children has unit doses that are selected on the basis of body weight. Oral capsule (35, 40 and 75mg) and suspension formulations are currently promptly on the market. As fast dissolving tablets can hold the dose up to the 500mg we can suitably administer 75mg of dose[4-5].

Solid dispersion of Oseltamivir was prepared with PVP K30 in different drug: carrier ratio using solvent evaporation methods. The optimized solid dispersion (drug: PVP K30, 1:0.5 ratio) were further used to prepare fast dissolving tablet by direct compression method using superdisintegrants such as Crospovidone and Xanthan gum. Infrared spectroscopy and differential scanning calorimetry were performed to identify the physicochemical interaction between drug and optimized formulation[6-7].

**Advantages of Fast Dissolving Tablet**[3]

1. Improved compliance/added convenience
2. No water needed
3. No chewing needed
4. Better taste
5. Suitable for controlled as well as fast release actives
6. Ability to produce benefits of liquid medication within the style of solid preparation.
7. Allows high drug loading.
8. Adaptable and amenable to existing processing and packaging machinery
9. Cost- effective.

## MATERIAL AND METHODS

### Materials

Oseltamivir were received from Zydus Cadila Ltd, Ahmedabad. PVP K-30, Xanthan gum, Crospovidone, Mannitol, Magnesium stearate, Talc was received from Shri Sai Chemical, Solapur.

### Method

**Calibration curve of Oseltamivir**

Accurately weighed 10mg of drug was transferred to 10ml volumetric flask and dissolved in methanol, this was considered as stock solution. From stock solution 0.1ml, 0.2ml, 0.3ml, 0.4ml, 0.5ml, were taken and was make up the volume to 10ml with methanol to get respective concentrations of (10, 20, 30, 40 and 50)µg/ml. Prepared samples were analyzed by using ultraviolet double beam spectrophotometer at λmax 218nm.

**Preparation of Oseltamivir fast Dissolving Tablet**

**Step-1 Solid Dispersion Technique-Solvent Evaporation Method**

**The solid dispersion method**

The solid dispersions of Oseltamivir were prepared by dissolving the mixture of Oseltamivir and the PVP K 30 at the weight ratios of 1:0.5 w/w, with the help of a bottom volume of mixture of methanol and acetone solvent system (1:1 v/v). The solvent was removed by evaporation under reduced pressure at 37ºC. Solid mass obtained was skilled the # sixty and keep in vacuum desiccator till use.

**Step-2 Preparation of Oseltamivir Fast Dissolving Tablet**

Fast dissolving tablets of Oseltamivir were prepared by direct compression method. All the ingredients were powdered separately and passed through sieve no. 40 separately. The drug and all excipient were mixed by adding small portion of each at a time and blending it to get a uniform mixture and kept aside. After then the other ingredients were mixed in geometrical order, in an inflate polyethylene pouch magnesium stearate and talc were added last and

mixed for further two minutes and the tablets were compressed using 8-12mm oval shape punches to get tablets of 150mg weight. The tablet were prepared and shown in formulation (Table No.2).

**Evaluation of fast dissolving tablets of Oseltamivir**

**Compatibility Studies**

**FTIR**

IR study of pure drug Oseltamivir and physical mixture were performed to find out any possible drug-excipient interaction by KBr pellet method using (IR prestige 21 Shimadzu Corporation, Japan) spectrophotometer[8].

**DSC**

The differential Scanning Calorimetry Analysis was performed by using DSC 1/700/2960METTLER DSC 60, Mettler Toledo India Pvt. Ltd. Switzerland, using crucible aluminum 40µL at, 10°C /min heating rate, the temperature range was 25°C to 300°C in a nitrogen atmosphere[8].

**XRD**

Physical natures of drug and optimized formulation were analyzed by X-ray diffraction (XRD). XRD patterns of the powdered samples of the drug and the optimized formulation recorded using X-ray powder diffractometer with a copper tube anode over the interval 0-60° 2θ−1. The operational parameters were as follows: Generator tension (voltage) of 45 kV; generator current of 40mA; scan step time of 9/s, and scan step size of 0.008° (2θ).

**Evaluation of blends**

The prepared powder blend was evaluated for bulk density, tapped density, Carr's index, Hausner's ratio and angle of repose.

**Bulk density (Db)**

Accurately weighed quantity of powder blend from each formula after weighing the powder blend was transfer in to a measuring cylinder. The volume occupied by the powder blend was measured which gave the bulk volume. The bulk density of powder blends was calculate by using the following formula.

$D_b = V_0/M$

Where, M is mass of powder, V0 is bulk volume of the powder

**Tapped density (Dt)**

Accurately weighed quantity of powder blend from each formula after weighing the powder blend was transfer into a measuring cylinder. After transferring the measuring cylinder was tapped until no further blends were calculated by using the following formula.

Dt =Vt/M.

Where, M is mass of powder, Vt is tapped volume of the powder.

**Carr's index (%)**

The Carr's index was calculated as 100 times the ratio of the difference between tapped density and bulk density to the tapped density. The Carr's index of the powder was calculate by using following formula.

Carr's index =100 x Tapped density/Tapped density - Bulk density.

**Hausner's ratio**

Hausner's ratio is a measure of fractional force existing in moving powder mass. Hausner's ratio is the main ratio of tapped density to bulk density. It is calculate by following formula.

Hausner's Ratio = Bulk Density/Tapped Density

**Angle of repose (Θ)**

Angle of repose was mainly determined by using funnel method. The accurate quantity of prepared powder blend was transferred through a funnel that can be raised vertically until a maximum cone height was obtained. The radius of aggregate was measured and angle of repose was calculated by using following formula.

Θ = tan-1(h/r)

Where, Θ = angle of repose

**Evaluation of tablets**

**Weight variation**

Twenty tablets were selected and weighed on digital weighing balance (Ohaus, USA), and average weight was determined. Then individual tablets were weighed, and the individual weight was compared with an averageweight[9]. The Standard limit as shown in below.

**Friability**

Friability of the tablet can be determine in laboratory by Roche Friabilator. This consist of a plastic chamber that revolves at 25 rpm, dropping

the tablets through a distance of six inches in the friabilator, which is then operate for 100 revolution. After complete these process tablets were dusted and reweighed[9].

Friability = W1-W2/W1×100

Where, W1 = Initial weight and W2 = final weight

**Thickness**

Thickness of tablets was determined using vernier calliper (Indian Calliper Industries, Ambala, India). Three tablets from each batch were used, and an average value was calculated[8].

**Hardness**

In these technique tablet crushing strength was measured using a Monsanto hardness tester. These hardness technique using three tablets from each formulation batch were tested randomly, andtheaveragereadingwasnoted[10]. The hardness is measured in kg/cm$^2$.

**Content uniformity test**

Ten tablets (150mg) were powdered in mortar pestle, and the blend equivalent to 2mg of oseltamivir was weighed and dissolved in 100mL of 6.8 pH phosphate buffers solutions. After preparing the resolution was sonicated after sonicated filtered through whatman filter paper, and suitably diluted with 6.8pH phosphate buffer and the drug content was analyzed by using double beam UV spectrophotometer (UV-1800 Shimadzu) at 218nm, respectively. Each sample was analyzed in triplicate.

***In-vitro* disintegration time**

The test was carried out on 6 tablets using digital tablet disintegration tester (Veego, India). Distilled water at 37°C ± 2°C was used as a disintegration media, and the time taken for complete disintegration of the tablet with no palpable mass remaining in the apparatus was measured in seconds[11].

**Wetting Time**

Apetriplate containing 6mL of distilled water was taken. A tablet containing a small quantity of amaranth colour was placed on it. Time required for the upper surface of the tablet to become completed was noted[12].

***In-vitro* dissolution data**

Dissolution test was determine by using USP type II (paddle) apparatus. The paddle was rotated at 50rpm. pH 6.8 Phosphate buffer was used as dissolution medium (900ml) and was maintained at 37 ± 1°C. Samples of 5ml were withdrawn at predetermined intervals (5, 10, 15, 20, 25 and 30), filtered and replaced with 5ml of fresh dissolution medium.

The collected samples were suitably diluted with dissolution fluid, wherever necessary and were analyzed for the drug at 218nm by using ultraviolet double beam spectrophotometer.

## RESULTS AND DISCUSSION

**Calibration of Oseltamivir**

The λmax of Oseltamivir was determined by scanning the 10µg/ml solution of drug using UV-Spectrophotometer and was found to be 218nm. The absorbance of the solution 10 to 50µg/ml was measured in UV-Spectrophotometer at 218nm. (Table No.1). The linear correlation was found to be 0.9974 (pH 6.8 Phosphate buffer) (Figure No.1).

**Preformulation Evaluations**

**Fourier Transmission Infra –Red (FT-IR) Studies**

FT-IR spectrum of pure drug Oseltamivir and physical mixture of drug and superdisintegrants Crospovidone and Xanthan gum were studied and spectrum is shown in Figure No.2, 3 and 4. Drug polymer compatibility studies are very important in order to confirm the drug structure, its activity, and its degradation rate and release pattern with various polymeric substances used in the formulation. In these present study, it was mainly observed that, there were no major shifts in its individual main peaks. So this indicates that there was no compatibility issues of drug with formulation polymers used.

**Differential Scanning Calorimetry (DSC) Studies**

The thermal behavior of Oseltamivir as well as solid dispersion incorporated optimized batch formulation as shown in Figure No.5, 6 and 7. Showed an initial flat profile followed by a sharp characteristic endothermic peak with an onset at 208°C (The observed melting point of the drug was

in agreement with the endothermic peak of the thermogram). The thermogram of pure drug compact shown in Figure No.6 and 7 retains the onset temperature in the endotherm peak at 168°C. There is no shift in the endothermic peak of oseltamivir indicating that there is no physical or chemical change.

**X-ray Diffraction**

The x-ray diffraction pattern of Oseltamivir shown sharp peak, at 16.980 cps and less diffused peaks at 3.382 indicating the crystalline nature of drug as shown in Figure No.8. The combination of drug (Oseltamivir + Crospovidone) and optimized formulation F4 shown that the height peak at 17.046 shows sharp peak and less diffused peak at 2.050 as shown in Figure No.9. It showed that the diffraction peaks at 2Ɵ degree 5.180 to 44.150. The combination of drug (oseltamivir + Xanthan gum) and optimized formulation F7 shown that the height peak at 17.046 shows sharp peak and less diffused peak at 3.021 as shown in Figure No.10. It showed that the diffraction peaks at 2Ɵ degree 5.180 to 29.540. However the x-ray diffraction pattern of pure Oseltamivir and optimized batch F4 and F7 were simply a superimposition of each component with respect to the peaks of Oseltamivir. Moreover, the relative intensity and 2Ɵ angle of these peaks remain unchanged. Thus, there was no amorphization of Oseltamivir which still remain in original crystalline form.

**Precompression Evaluations for the Powder Blend**

Precompression evaluations were done to ensure the flow properties of the powder blend. Good flow properties of the powder blend will yield the tablets of desired quality and ease the tableting process. So it was mandatory to assess the flowability of the blend before compression. The various precompression evaluations were as follows

- Angle of repose
- Bulk density
- Tapped density
- Compressibility Index
- Hausner's ratio

**Angle of repose**

The angle of repose can be correlated with type of flow powder. The angle of repose below 25° indicate excellent flow properties. The angle repose of all the formulations ranges from 21°.80' to 25°.46'. It was evident from the results, that the powder blends of all formulations posses' good flow properties. The results of angle of repose for all the formulations were summarized in Table No.3.

**Bulk density**

The bulk density was determined to assess the free flowing property of the powder blend. The bulk density of all formulations ranges from 0.29g/cm$^3$ to 0.33g/cm$^3$. The results indicate that the powder blends of all fifteen formulations were having good flow properties. The results were summarised in Table No.3.

**Tapped density**

The tapped density of powder is important parameters in compressibility of the powder. The tapped density of all the formulations ranges from 0.33g/cm$^3$ to 0.38g/cm$^3$. From the results, it was inferred that the powder blend of all formulations posses good flow properties. The results of all the formulations were summarised in Table No.3.

**Compressibility Index**

The compressibility index was the simplest method to measure the free flowing of powder blends of all formulations. The value below 21% show good compressibility. The compressibility index of all the formulations ranges from 9.09 to 15.78. The results indicate that the powder blend of all formulations possess good flow properties. The results of all formulations were summarised in Table No.3.

**Hausner's ratio**

The Hausner's ratio is another parameter the flow properties. The value of ratio below 1.25 indicate good flow property. The Hausner's ratio for powder blends of all 8 formulations ranges from 1.11 to 1.18. It was observed from the results that the powder blends of all formulations have good flow properties. The results were summarised in Table No.3.

It was evident from the results of the precompression studies, that the powder blends of

all eight formulations posses good flow properties, which were within the standard limits and were qualified for compression into Tablets.

**Post Compression Evaluations**

The tablets obtained after compression were evaluated on various parameters to determine their quality and to ensure that the resultant product meets all necessary criteria's required for the fast dissolving tablets.

**Weight variation test**

The weight variation of the formulation F1 to F8 ranged from 146.5 to 149mg. The percentage deviation of tablets have to be specific, and they should not differ ± 7.5 % according to IP specification. The results were shown in Table No.4.

**Hardness**

The hardness of the all formulation F1 to F8 ranged from 3.0 to 3.2kg/cm$^2$. The results indicate that the tablets of all formulations have uniform hardness. The results were shown in Table No.4.

**Friability test**

The friability of the tablet was found to be less than 1% which was considered within the limit [USP]. The results indicate that the friability for tablets of all formulations were below 1% and hence passes the test. The results shown in Table No.4.

**Thickness**

The percentage deviation of thickness of the formulation F1 to F8 ranged from 3mm.The results indicate that the Tablets of all formulations were of uniform size. The results were shown in Table No.4.

**Drug content**

The uniformity in the drug content is an important measure. The content uniformity was found within 96.00% to 99.87% of the 75mg of Oseltamivir. The results indicate that the contents for tablets of all formulations were uniform and contains therapeutic dose of the active ingredient. The results were shown in Table No.4.

**Wetting time**

The wetting time indicates the capacity of the superdisintegrants to absorb water and completely wet the tablet at the earliest time possible, which were the significant characteristics of fast dissolving tablets. The tablet was minimum wetting time will enable faster disintegration of the tablets, which is most important criteria for fast dissolving tablet. The wetting time for formulations F1, F2, F3, F4, F5, F6, F7, F8 were found to be 18, 19, 14, 10, 15, 14, 10, 8 seconds respectively. These results indicates that the wetting time of all tablets were within the limits. The result were shown in Table No.5.

**Disintegration time**

The disintegration time was the time taken by the tablet to break down in to small particles, in the presence of aqueous medium. It varies with type and concentration of the super disintegrants incorporated in the formulation. The disintegration time for formulations F1, F2, F3, F4, F5, F6, F7, and F8 was found to be 38, 29, 22, 12, 45, 31, 23, and 14 respectively. The results indicate that the disintegration time for tablets of all formulations are within the limits were within the permissible limits, which indicate that the Tablets of all formulations disintegrate quickly. The results were shown in Table No.5.

**Dissolution studies**

The dissolution studies were performed to evaluate the release profile of the drug, which relates the percentage of drug release from its dosage form with the function of time. The superdisintegrants were added to the solid dosage formulations to enhance the disintegration time and thereby enhancing the faster release of active drug from its dosage form. The desired quality of fast dissolving tablets was to have a maximum release of therapeutic dose at a very minimal time period. The maximum drug release at a time period of 30 minutes is noted for all the formulations. The drug release for tablets of all formulations ranges from 84.38 to 99.82 the results indicate that the drug release of all the formulations were found to be above 80 % in 30minutes. The release rate of the superdisintegrants were in the order of Crospovidone and Xanthan gum. The results were summarised in Table No.6. The From the results obtained from the post compression studies of tablets of all eight formulations, the formulation 4 with concentration of 15% Crospovidone was found

to be the best formulation with a disintegration time of 12secs, wetting time of 10secs and drug release of 99.82 which was the highest of all formulations. The results were shown in Table No.6.

**Table No.1: Standard Calibration Graph Values of Oseltamivir in Methanol**

| S.No | Concentration (ug/ml) | Absorbance |
|---|---|---|
| 1 | 0 | 0 |
| 2 | 10 | 0.04 |
| 3 | 20 | 0.093 |
| 4 | 30 | 0.142 |
| 5 | 40 | 0.192 |
| 6 | 50 | 0.252 |

**Table No.2: Formulation Table for Oseltamivir Fast Dissolving Tablet**

| S.No | Ingredient | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Oseltamivir + PVP-k30(1:0.5) | 112.5 | 112.5 | 112.5 | 112.5 | 112.5 | 112.5 | 112.5 | 112.5 |
| 2 | Crospovidone | 3 | 5 | 7 | 9 | - | - | - | - |
| 3 | Xanthan gum | - | - | - | - | 3 | 5 | 7 | 9 |
| 4 | Mag.stearate | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 5 | Talc | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 6 | Mannitol | 26.5 | 24.5 | 22.5 | 20.5 | 26.5 | 24.5 | 22.5 | 20.5 |
| 7 | Total weight | 150 | 150 | 150 | 150 | 150 | 150 | 150 | 150 |

**Table No.3: Pre compression studies of Powder blend**

| S.No | Formulation Code | Angle of repose | Bulk density(gm/ml) | Tapped density(gm/cc) | Carrs Index (%) | Hausners ration |
|---|---|---|---|---|---|---|
| 1 | F1 | 24.46 | 0.31 | 0.35 | 11.42 | 1.11 |
| 2 | F2 | 21.80 | 0.32 | 0.36 | 11.11 | 1.12 |
| 3 | F3 | 22.61 | 0.30 | 0.34 | 11.76 | 1.13 |
| 4 | F4 | 24.44 | 0.29 | 0.33 | 12.12 | 1.13 |
| 5 | F5 | 24.44 | 0.31 | 0.36 | 13.88 | 1.16 |
| 6 | F6 | 25.4 | 0.32 | 0.38 | 15.78 | 1.18 |
| 7 | F7 | 25.46 | 0.3 | 0.34 | 12.79 | 1.14 |
| 8 | F8 | 23.49 | 0.3 | 0.33 | 9.09 | 1.1 |

**Table No.4: Post compression studies of Oseltamivir Fast Dissolving tablet**

| S.No | Formulation code | Average Weight (mg) | Hardness (kg/cm2) | Friability (%) | Thickness (mm) | Drug content (%) |
|---|---|---|---|---|---|---|
| 1 | F1 | 148.5 | 3.2 | 0.84 | 3 | 98.21 |
| 2 | F2 | 146.5 | 3.2 | 0.68 | 3 | 97.69 |
| 3 | F3 | 147.5 | 3.2 | 0.84 | 3 | 98.87 |
| 4 | F4 | 149 | 3.2 | 0.33 | 3 | 99.69 |
| 5 | F5 | 145.5 | 3.2 | 0.86 | 3 | 96.00 |
| 6 | F6 | 147.5 | 3.0 | 0.61 | 3 | 97.75 |
| 7 | F7 | 148 | 3.0 | 0.43 | 3 | 99.87 |
| 8 | F8 | 148.5 | 3.0 | 0.67 | 3 | 99.42 |

**Table No.5: Post compression studies of Oseltamivir Fast Dissolving table**

| S.No | Formulation code | Disintegration time (sec) | Wetting Time (sec ) |
|---|---|---|---|
| 1 | F1 | 38 | 18 |
| 2 | F2 | 29 | 19 |
| 3 | F3 | 22 | 14 |
| 4 | F4 | 12 | 10 |
| 5 | F5 | 45 | 15 |
| 6 | F6 | 31 | 14 |
| 7 | F7 | 23 | 10 |
| 8 | F8 | 14 | 8 |

**Table No.6: *In-vitro* drug release of formulation**

| S.No | Time (min) | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 5 | 17.45 | 34.36 | 36.50 | 34.83 | 10.83 | 12.13 | 17.53 | 13.99 |
| 3 | 10 | 34.56 | 42.52 | 44.06 | 59.53 | 21.61 | 25.11 | 38.35 | 28.31 |
| 4 | 15 | 45.46 | 58.43 | 72.70 | 86.33 | 34.84 | 40.72 | 48.06 | 40.07 |
| 5 | 20 | 60.34 | 73.28 | 87.59 | 95.45 | 47.27 | 59.72 | 69.66 | 58.33 |
| 6 | 25 | 76.62 | 84.75 | 98.14 | 98.18 | 60.05 | 85.38 | 88.03 | 83.80 |
| 7 | 30 | 84.38 | 93.92 | 98.56 | 99.82 | 83.98 | 88.17 | 98.27 | 96.46 |

**Graph**

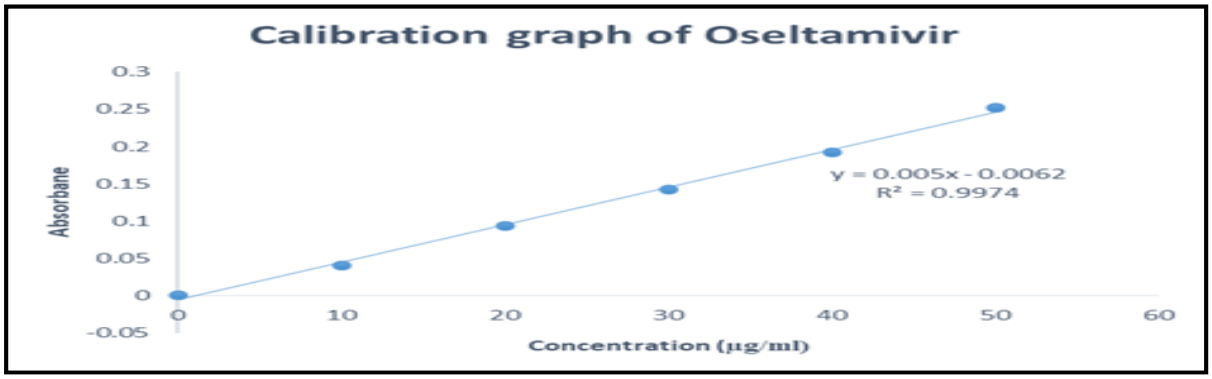


**Figure No.1: Calibration curve of Oseltamivir**

**Drug excipient compatibility study**

**FTIR RESULT**

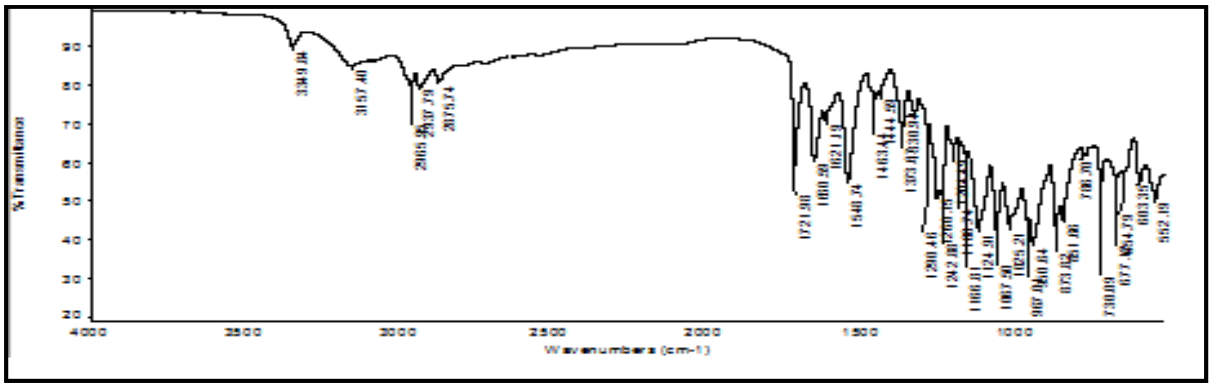


**Figure No.2: FTIR spectrum of Oseltamivir**

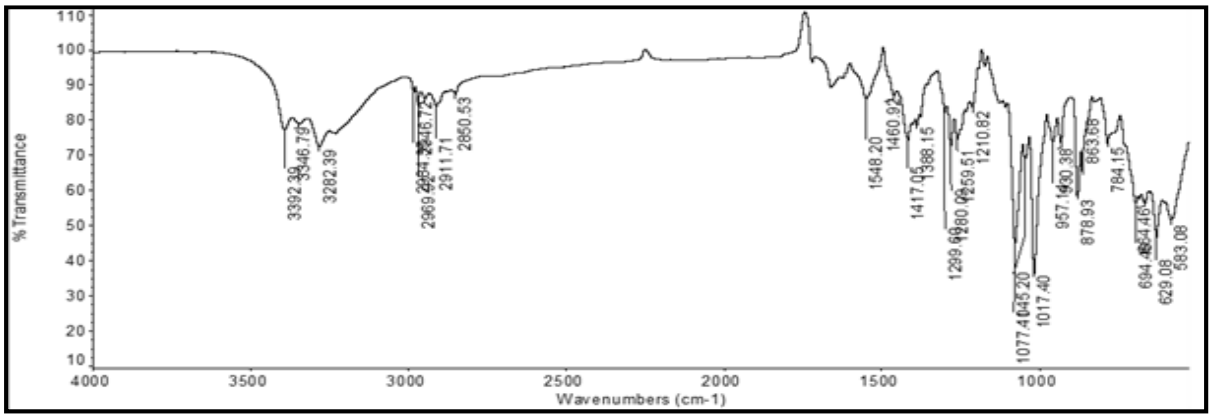


**Figure No.3: FTIR spectrum of Oseltamivir + Crospovidone**

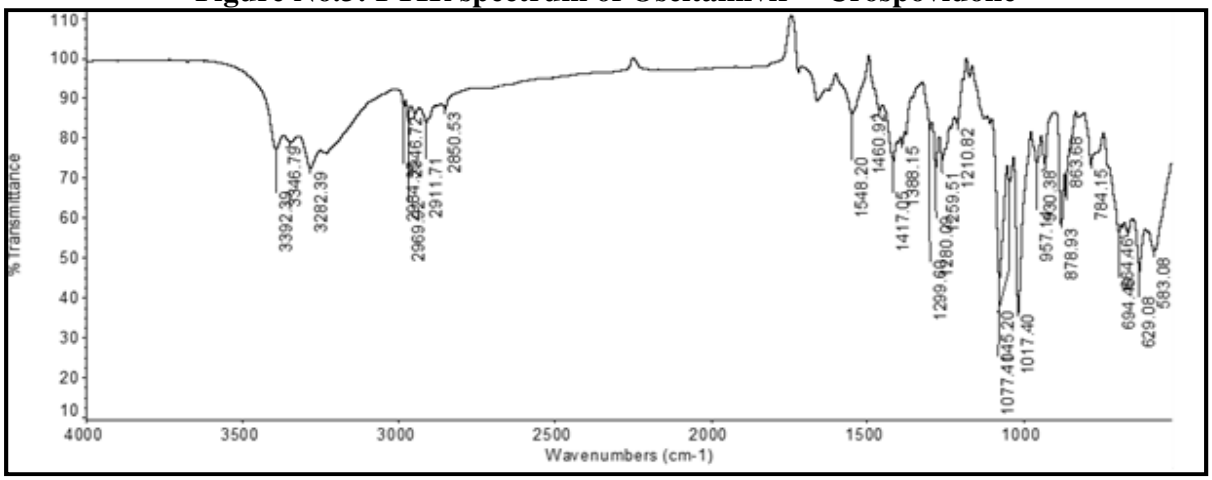


**Figure No.4: FTIR spectrum of Oseltamivir + Xanthan gum**

**DSC RESULT**

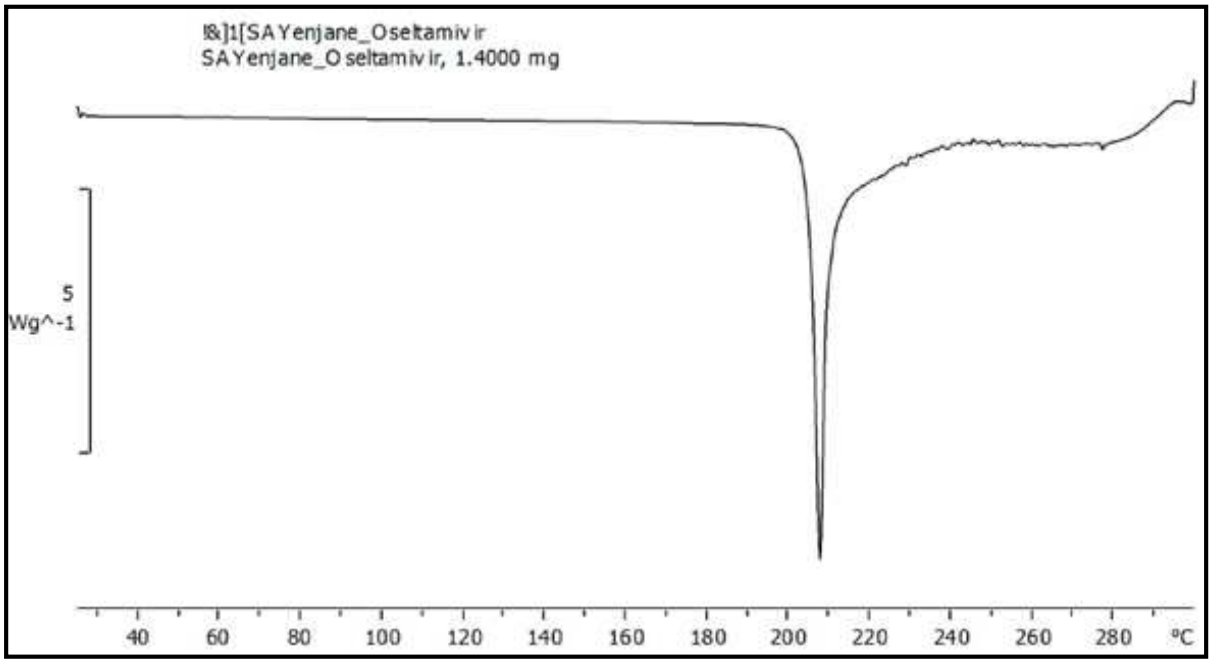


**Figure No.5: Thermogram of Oseltamivir**

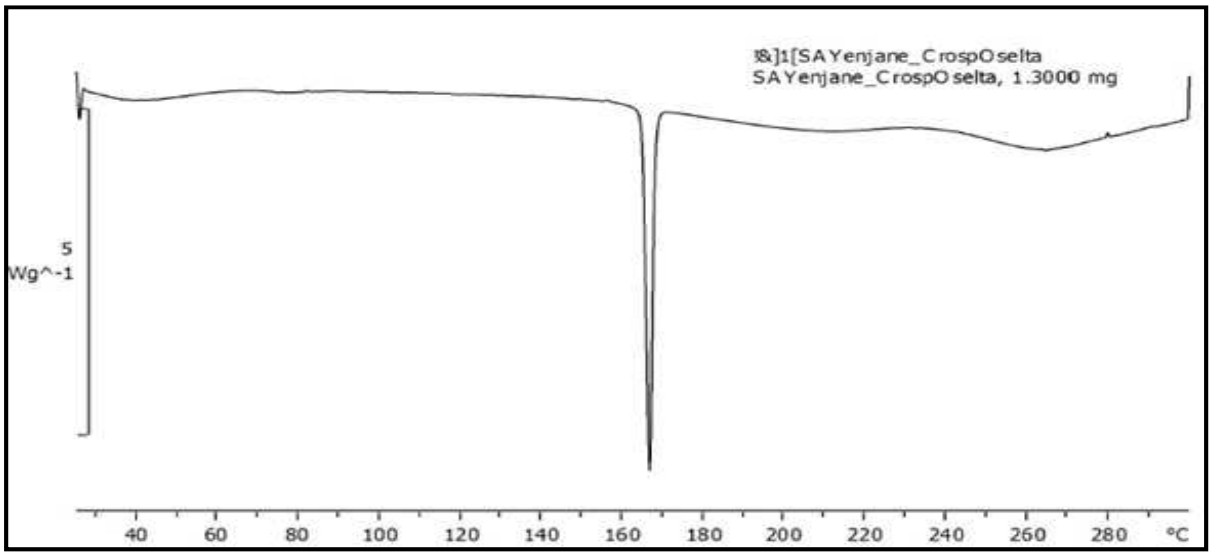


**Figure No.6: Thermogram of Oseltamivir + Crospovidone**

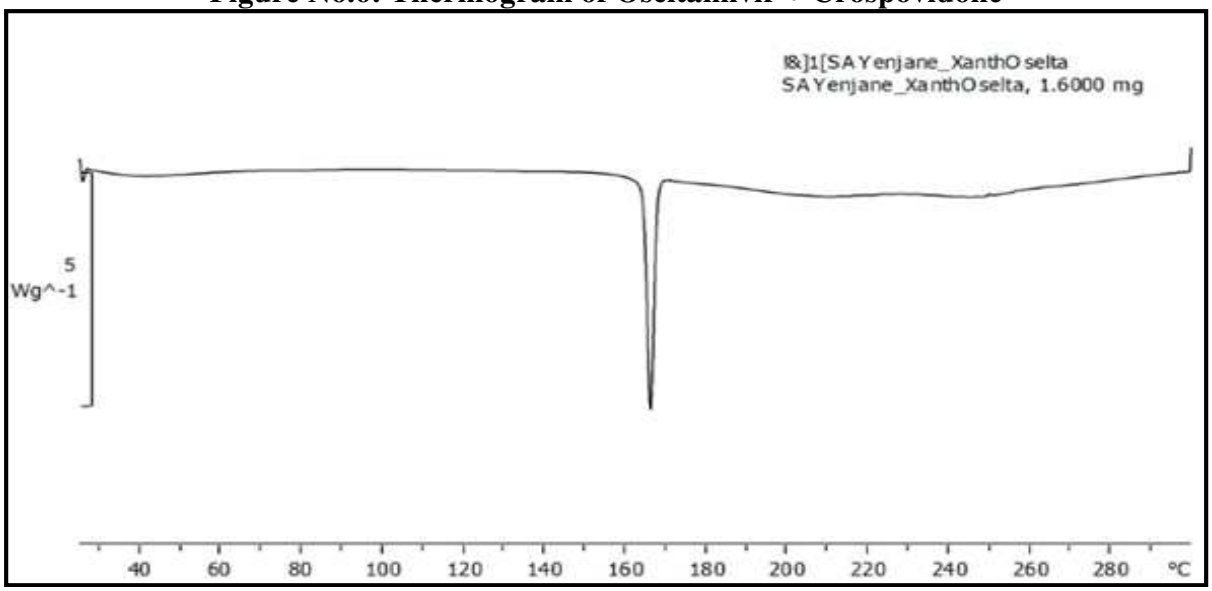


**Figure No.7: Thermogram of Oseltamivir + Xanthan gum**

**XRD RESULT**

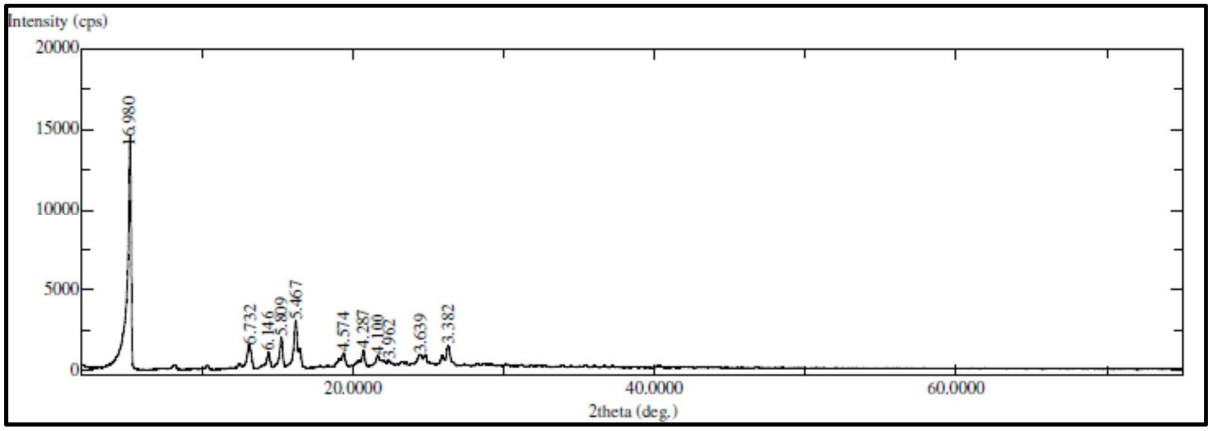


**Figure No.8: XRD of Oseltamivir**

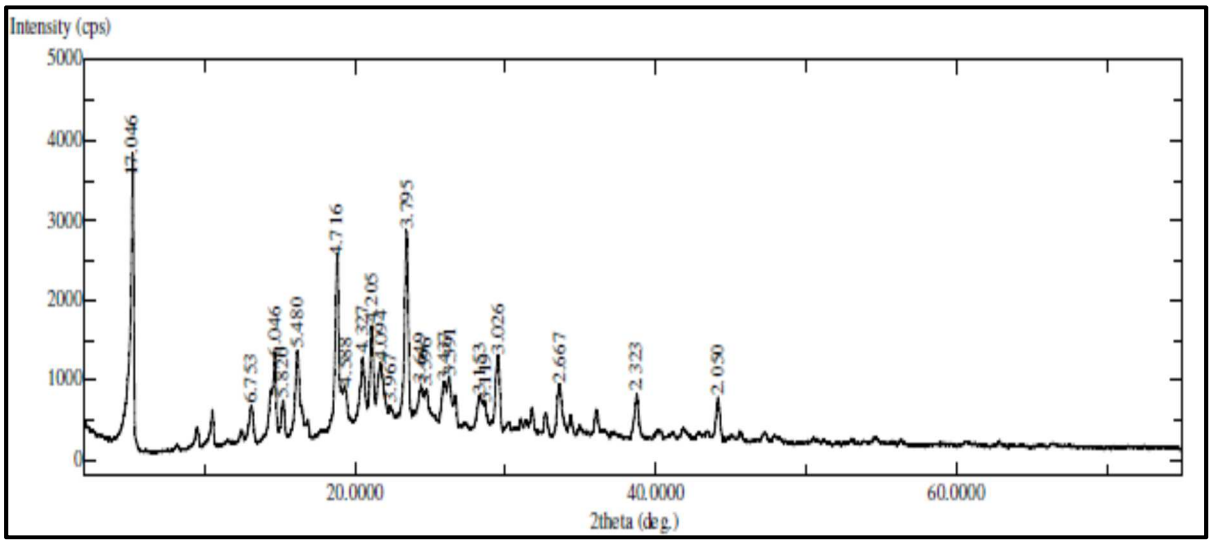


**Figure No.9: XRD of Oseltamivir + Crospovidone**

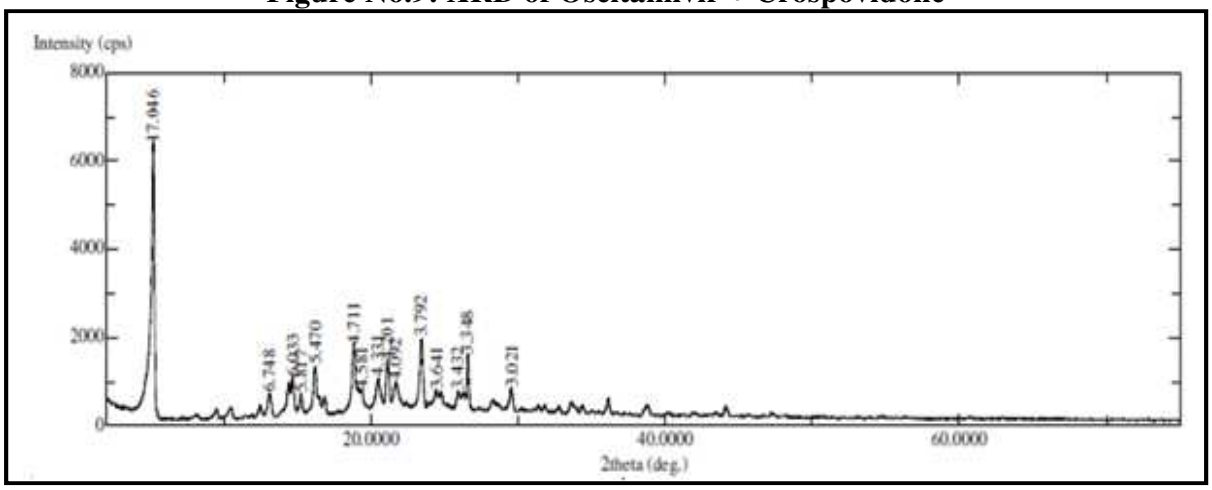


**Figure No.10: XRD of Oseltamivir + Xanthan gum**

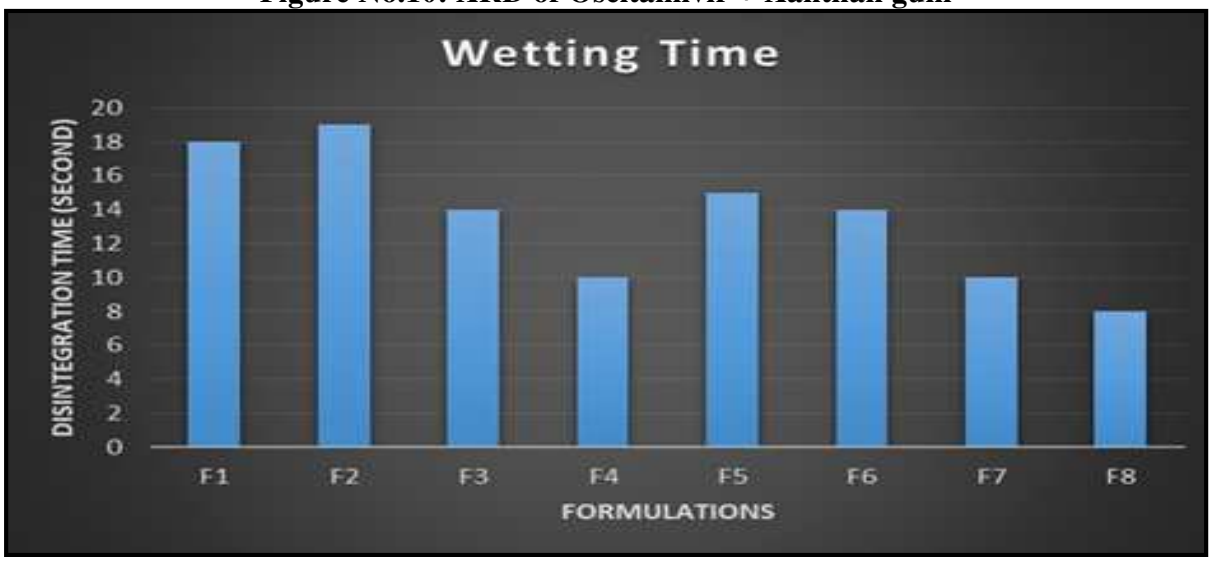


**Figure No.11: Wetting Time Profile Crospovidone and Xanthan gum**

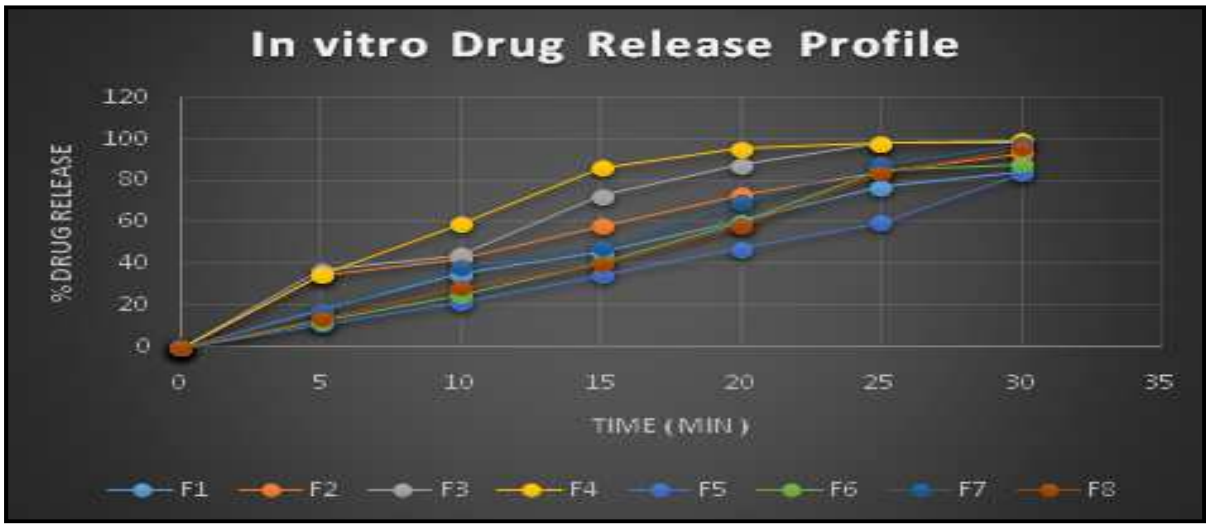


**Figure No.12: Graph representing *In-vitro* dissolution data of Oseltamivir containing Crospovidone and Xanthan gum**

## CONCLUSION

It was concluded, that Oseltamivir can be successfully formulated as fast dissolving tablets using superdisintegrants i.e. Crospovidone and Xanthan gum in different concentrations (6, 9, 12, and 15%) by direct compression method. The formulation containing 15% of Crospovidone as superdisintegrant was found to be outstanding than other formulations in terms of disintegration time and rate of dissolution.

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## CONFLICT OF INTEREST

We declare that we have no conflict of interest.

## BIBLIOGRAPHY

1. Mangal M, Thakur N, Bansal R. Fast Dissolving Tablet: An Approach for Emergency Treatment, *International Journal of Research in Ayurveda and Pharmacy,* 3(3), 2012, 377-380.
2. Singh S, Masih A, Kumar A. Fast Dissolving Tablets: A Review, *International Journal of Current Pharmaceutical Research*, 9(2), 2017, 8-18.
3. Siddiqui M, Garg G, Sharma P. Fast Dissolving Tablets: Preparation, Characterization And Evaluation: An Overview. Department of Pharmaceutical Technology, *Meerut Institute of Engineering and Technology, Baghpat Bypass, Delhi,* 4(2), 2010, 87-96.
4. Davies B. Pharmacokinetics of oseltamivir: an oral antiviral for the treatment and prophylaxis of influenza in diverse populations, *Journal of Antimicrobial Chemotherapy,* 2(1), 2010, 5-10.
5. Iswariya V, Suma B, Shrisha, Roja B. Formulation Development and Evaluation of Oseltamivir Fast Dissolving Tablets Using Super Disintegrants, *International Journal of Pharmacy and Pharmaceutical Research,* 6(1), 2016, 23-30.
6. Bhatu P, Mane A. The technologies used for developing orally disintegrating tablets: A review, *Acta Pharm,* 61(1), 2011, 117-139.
7. Surendran S, Iyer S. Fast Dissolving Tablet using Solid Dispersion Technique: An Overview, *Indo American Journal of*

*Pharmaceutical Research*, 5(2), 2015, 668-672.

8. Satpute M, Tour N. Formulation and In vitro evaluation of fast dissolving tablet of metroprrplol tartrate, *Brazilian Journal of pharmaceutical scie.*, 49(4), 2013, 784-791.
9. Jadhav S, Kaudewar D, Kaminwar G, Jadhav A, Kshirsagar R. Formulationandevaluation of dispersible tablets of diltiazem hydrochloride, *International Journal of Pharm Tech Research,* 3(3), 2011, 1314-1321.
10. Metker V, Kumar A, Pathak N, Padhee K, Sahoo S. Formulation and evaluation of orodispersible tablets of lornoxicam, *International Journal of Drug Development and Research*, 3(1), 2011, 281-285.
11. Arya A, Sharma S, Kumar J, Chandra A, Jaiswal P. Formulation and evaluation of mouth dissolving tablets of ranitidine HCL, *International Journal of Pharm Tech Research*, 2(2), 2010, 1574-1577.
12. Senthilnathan B, Rupenagunta A. Formulation development and evaluation of venlafaxine hydrochloride orodispersible tablets, *International Journal of Pharmaceutical Sciences and Research*, 2(4), 2011, 913-921.
13. Parmar R, Baria A, Tank H, Faldu S. Formulation and evaluation of domperidone fast dissolving tablets, *International Journal of Pharm Tech Research*, 1(3), 2009, 483-487.
14. Gupta A. Fast Dissolving Tablet- A Review, *The Pharma Innovation*, 1(1), 2012, 1-6.
15. Rane D. Formulation and evaluation of fast dissolving tablet of albendazole, *International Current Pharmaceutical Journal*, 1(10), 2012, 311-316.
16. Sravani S, Sailaja D. Formulation and Evaluation of Fast Dissolving Tablets of Felodipine, *IOSR Journal of Pharmacy*, 6(7), 2016, 104-112.
17. Chotai N, Suthar R, Shah D. Formulation and Evaluation of Fast Dissolving Tablets of Ondansetron by Solid Dispersion in Superdisintegrants, *Pharmaceutical Research*, 42(3), 2013, 49-54.

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