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Formulation and Evaluation of Fast Dissolving Tablets of Amisulpride Using Co-Crystallization Technique

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ABSTRACT

Objective: The promising path to modify the solid state properties of drug compounds such as solubility and dissolution is the co-crystallization of drugs with coformers. The goal of the current work was to prepare, formulate, and evaluate the Amisulpride cocrystal by screening different coformers followed by the formulation and evaluation of fast dissolving tablets. **Methods:** For the preparation of Amisulpride cocrystals various techniques like Solvent evaporation, Solvent drop grinding, Dry grinding method, and various coformers were screened. Out of which Solvent evaporation technique and Sodium acetate as a coformer was optimized as other coformers were found to be incompatible with the drug for preparation of cocrystals. The prepared cocrystals were then subjected to the evaluation of various parameters. Fast dissolving tablets of Amisulpride cocrystals were formulated and evaluated. **Results:** The formation of cocrystals were then confirmed by alteration in melting point, shifts in IR bands, and changes in 2θ values in X-ray powder diffraction (XRPD) spectra, Scanning electron microscopy (SEM) images of cocrystals showed distinctive and sharp crystals as compared to that of drug and coformer. There was a 9.9 fold increase in the solubility of cocrystals as compared to that of pure drug, which indicates the interaction of Amisulpride and sodium acetate and the formation of cocrystals. Fast dissolving tablets of Amisulpride cocrystal were successfully prepared by the direct compression method with improved disintegration time and dissolution rate.
Conclusion: Amisulpride cocrystal was prepared with modified properties using sodium acetate as coformer and formulated as Fast dissolving tablets with faster disintegration and a greater dissolution rate.

INTRODUCTION:

Drug's solubility and dissolution rate is a determining factor for rate and extent of absorption following oral administration that offers a challenge in the pharmaceutical industry for effective development and formulation of the drug. About 60% of the drugs that are coming from synthesis and about 40% in the development of drugs have the problem of poor solubility due to which they face many bioavailability issues, hence to cope up with these problems, various strategies have been used, for example, co-crystallization technique, solid dispersion, salt formation, co-solvency, inclusion complex formation with cyclodextrin, microencapsulation, nano-crystals, etc.[1-4]

Co-crystallization is the technique that is used frequently when the main aim is to modify the solubility of the drug. Pharmaceutical cocrystal is the most promising approach to enhance the drug's solubility and dissolution rate and to modify the physical and chemical stability of the drug. The advantage of this technique is that while enhancing these properties of the drug it does not affect the pharmacological properties of the drug substance. It is a solid shape designed using synthon based design in which the active pharmaceutical ingredient and the coformer are connected through strong supramolecular synthons. Cocrystal can be characterized as a multicomponent stoichiometric system linked by non-covalent interactions in which, under ambient conditions, two separate components are solid. The active pharmaceutical ingredient and a benign material, called a coformer, is a pharmaceutical cocrystal.[5-7] There are various techniques for the formation of cocrystals like solvent evaporation, dry grinding, solvent drop grinding which is also known as wet grinding, cooling crystallization, etc.

Fast dissolving drug delivery systems are novel techniques to deliver the drugs and aim for designing dosage forms, convenient to manufacture and administer without water, offering immediate release, and enhanced bioavailability.[8] This segment of formulation technique is specially designed for geriatric, paediatric, psychotic patients who are unable to swallow or refuse to swallow conventional oral formulation, bedridden, and for active patients who may not have access to water due to there busy life schedule or due to traveling. Food and Drug Administration (FDA) described Fast dissolving tablet (FDT) as a solid type of dosage form containing API or medicinal substance that dissolves or disintegrates quickly when placed on the tongue within seconds. FDTs are also known as rapid dissolving, mouth dissolving

tablets, orodispersible tablets, porous tablets, melt-in-mouth tablets, and quick disintegrating tablets.[9]

As an alternative to conventional dosage forms fast dissolving drug delivery system was first developed in the late 1970s for paediatric and geriatric patients. More than half of the patient population prefers FDTs over other dosage forms as indicated in the recent market studies. It is formulated mainly by two techniques first by the use of superdisintegrants like crospovidone, croscarmellose sodium, and sodium starch glycolate. Another method is by maximizing the pore structure of tablets by vacuum drying and freeze drying.[10] From all the methods, the direct compression method is the most preferred because of its effortlessness, cost-effective, and quick procedure.[11]

Amisulpride is a second generation antipsychotic agent that belongs to BCS class II drug, it is practically insoluble in water.[12] As it possesses low aqueous solubility, its solubility has to be enhanced for better bioavailability and dissolution of the drug. It is used for the treatment of psychosis, schizophrenia, paranoid, dysthymia.[13]

For antipsychotics, antidepressants, fast onset, and enhanced bioavailability are desirable. There is therefore a clear scientific and clinical need to prepare new formulations of Amisulpride with an altered solubility and dissolution rate that can be produced for oral administration. The objective of the current work was therefore to prepare, formulate, and evaluate the Amisulpride cocrystal by screening different coformers followed by formulation and evaluation of fast dissolving tablets.

MATERIALS AND METHODS

Materials:

Amisulpride was a gift sample from the Alkem laboratories, Mumbai (India). All other chemicals and other materials were obtained from Modern science, Nashik (India). Double distilled water was used throughout the work.

Preparation of cocrystals:

For the preparation of Amisulpride cocrystals, various techniques like Solvent evaporation, Dry grinding, Solvent drop grinding methods, and various coformers like Sodium acetate, Oxalic acid, Succinic acid, Nicotinamide, Caffeine, Benzoic acid were screened. Out of

which Solvent evaporation technique and Sodium acetate as a coformer was optimized as other coformers were found to be incompatible with the drug for preparation of cocrystals.

Drug- Amisulpride

Coformer- Sodium acetate,

Technique- Solvent evaporation

Solvent- Methanol

Procedure- An equimolar of mol fraction mixture of Amisulpride and Sodium acetate was added to 5 ml methanol and gently heated at 50^0C (1:1, 1:2 ratio). Then the solution was allowed to evaporate slowly at the ambient conditions.[14]

Characterization of cocrystals:

Determination of melting point: The melting point of compounds was estimated using the digital melting point apparatus.

Saturation solubility: Solubility of the compound was determined by dissolving an excess amount of pure drug and cocrystals in 10 ml vials containing water respectively. Then the vials were subjected to agitation and allowed to stand for equilibration for 24 hrs. Then it was filtered through filter paper and diluted with distilled water and analyzed using a UV spectrophotometer.[15] The solubility enhancement ratio of cocrystals was calculated by using the following formula,

$$\text{Enhancement ratio} = \frac{\text{Solubility of the drug in cocrystal}}{\text{Solubility of the drug in water.}}$$

IR spectroscopy: IR spectroscopy was used to assess the possible interaction between drug and coformer. Samples were dispersed in KBr pellets and were scanned between 4000-400 cm^{-1} using Shimadzu IR spectroscopy.

Drug content: Cocrystal containing 10 mg of drug was taken and dissolved in 100 ml of phosphate buffer pH 6.8(100 µg/ml stock solution was prepared). Then 1 ml from this stock solution was taken and diluted up to 10 ml using phosphate buffer pH 6.8 as a solvent. (10 µg/ml). Then absorbance was measured using a UV spectrophotometer.

Scanning electron microscopy: Scanning electron microscopy was recorded on Carl Zeiss (Supra 5), Germany. The sample was fixed on a SEM-stub using double-sided adhesive tape, the sample was coated with a thin layer of gold under vacuum. Then the sample stub was kept in the SEM chamber and operated at 10 kV and images were captured at different magnification.

Powder X-ray diffraction: Powder X-ray diffraction spectra was recorded at 298 K on a Bruker D8 advance X-ray diffractometer with 0.2 step size at 0.02 θ/min scanning speed, 40 kV voltage and 40 mA current between scanning angles 5 to 90 degree (2θ).

Formulation of fast dissolving tablets of Amisulpride cocrystals:

An accurately weighed quantity of Amisulpride cocrystal equivalent to drug dose and all the other ingredients were passed through 60 mesh sieve and then mixed properly. The resulting blend was then directly compressed into tablets. The quantity of all components was constant except for the superdisintegrant and binder. Round concave tablets of 250 mg in weight were prepared. Table No.1 outlines the composition of various Fast dissolving tablet formulations.

Table No. 1: Composition of Fast dissolving tablet formulations

Ingredients (mg)	F1	F2	F3	F4	F5	F6
Amisulrpide cocrystal	144.4	144.4	144.4	144.4	144.4	144.4
Croscarmellose sodium	17.5	25	17.5	12.5	12.5	25
PVP K30	10	10	25	17.5	25	17.5
MCC PH 102	31.1	20.6	13.1	28.6	18.1	13.1
Mannitol	32.5	32.5	32.5	32.5	32.5	32.5
Sodium saccharin	10	10	10	10	10	10
Magnesium stearate	2.5	2.5	2.5	2.5	2.5	2.5
Talc	5	5	5	5	5	5
Total	250	250	250	250	250	250

Evaluation of pre-compression parameters:

Before compression, powder blends were firstly evaluated for various pre-compression evaluation parameters like tapped density, bulk density, angle of repose, Hausner ratio, and compressibility index.

Evaluation of post-compression parameters:

Thickness: The thickness of tablets was measured by using a digital Vernier caliper. Tablets were taken randomly from each of the formulations and the thickness of each of the tablets was then measured. Results are expressed as mean ± standard deviation i.e SD.

Weight variation: For this 20 tablets were selected randomly and average weight, as well as individual weight, was determined by using an electronic balance. Then the tablets were weighed individually and compared with the average weight.

Hardness: Three tablets were selected randomly from each of the batches and hardness was determined using Monsanto Hardness tester. Results are expressed as mean ± standard deviation.

Friability: It was measured using Roche friability tester. Firstly pre-weighed tablets were placed in the plastic chamber which was attached to motor revolving at 100 rpm, the tablets were dedusted, reweighed and percent weight loss was calculated using following formula,

$$\textbf{\% friability} = \frac{\text{Initial weight} - \text{Final weight}}{\text{Initial weight}} \times 100$$

Wetting time: For determination of wetting time of tablet, six circular tissue papers of 10 cm diameter were taken and placed in a petri dish and to that 10 ml of water which was containing amaranth dye was added to ensure complete wetting of tablet surface. Tablet was then placed on the surface of tissue paper in the petri dish at ambient temperature. Time taken by water to reach the upper surface of the tablet and to completely wet the tablet was then noted as the wetting time. This was performed in triplicate and time was recorded using a stopwatch.

Water absorption ratio: A piece of tissue paper that was folded twice was placed in a small petri dish (7.5 cm) with 7 ml of water. Tablet was placed on the tissue paper and allowed to

wet completely, then it was weighed. The ratio of water absorption (R) was calculated using the following equation,[16]

$$\text{Water absorption ratio (R)} = W_a - W_b / W_b x\ 100$$

Where,

Wa = Weight of the tablet after absorption of water,

Wb = Weight of the tablet before absorption of water.

Drug content: Powder equivalent to a single dose of Amisulpride was weighed, dissolved, and diluted in phosphate buffer pH 6.8. Then assayed for drug content at 280 nm using a UV spectrophotometer.

***In-vitro* disintegration time:** The digital tablet disintegration test apparatus was used to determine *in-vitro* disintegration time (DT) using phosphate buffer pH 6.8 at 37 ± 2^0C. Time in seconds taken by tablet for complete disintegration with no residue remaining in the apparatus was recorded as mean±SD.

***In-vitro* drug release study:** The dissolution test was performed using 900 ml of phosphate buffer pH 6.8 (dissolution media) at 37 ± 0.5^0C at 50 rpm. Samples (5ml) were collected at predetermined time intervals (5min) and replaced with an equal volume of fresh medium. The study was continued for 60 min, the resultant samples were analyzed for the presence of the drug by measuring the absorbance at 280 nm using UV visible spectrophotometer after suitable dilutions. Cumulative percent drug release was calculated using an equation obtained from the standard curve. The analysis was done using PCP Disso V-3 software.

To investigate the mode of release from the tablets the release data were analyzed with various mathematical models (Zero-order kinetic, First-order kinetic, Higuchi equation, Korsmeyer Peppas equation).

RESULTS AND DISCUSSION

Determination of melting point:

The melting point of pure drug, coformer, and that of cocrystals were determined and recorded as shown in Table No. 2. It was estimated as a preliminary screen for potential cocrystals. The melting point of cocrystal was found to be lesser than that of the Amisulpride.

The changed cocrystal melting point can be due to the interaction between Amisulpride and sodium acetate, shifts in molecular crystallinity, or different packing arrangements. This interaction results in some change in the molecular arrangement that leads to a new crystal form that possesses modified physical properties like solubility and/or melting point.

Table No. 2: Melting point of cocrystal

Melting point of drug (Amisulpride)	Melting point of coformer (sodium acetate)	Melting point of cocrystal (1:1)	Melting point of cocrystal (1:2)
125-127ºC	324ºC	120-122ºC	122-124ºC

Saturation solubility:

Saturation solubility of pure drug, coformer and prepared cocrystals was determined and recorded as shown in Table No. 3. This parameter was estimated as a preliminary screen for potential cocrystal. The solubility experiment showed that solubility of Amisulpride in water (aqueous media) was increased in Amisulpride-Sodium acetate cocrystal. The interaction between the amide nitrogen atom of Amisulpride and sodium acetate might have formed the cocrystals. Solubility was increased with both the ratios i.e., by both 1:1 and 1:2 ratio (Table No.3) but remarkably improved 9.9 folds with 1:2 ratio, that is, it was found that there was more enhancement in the solubility in 1:2 ratio as compared to that of 1:1 ratio, hence this ratio was further characterized and used for the formulation of fast dissolving tablets.

Table No. 3: Solubility of Cocrystals

	Pure drug (Amisulpride)	Cocrystal (Amisulpride + Sodium acetate) 1:1	Cocrystal (Amisulpride + Sodium acetate) 1:2
Solubility (mg/ml)*	0.103±0.002	0.737±0.004	1.04±0.015
Solubility enhancement ratio	----	7.0	9.9

FTIR spectroscopy:

IR spectrum of pure drug, coformer, and cocrystal was recorded as shown in Figure No. 1, 2, 3 respectively. Principle bands were identified and associated changes were then recorded. IR spectrum of Amisulpride (pure drug) shows the presence of characteristic peaks which was recorded at 3390.86 cm^{-1} for N-H stretching, SO_2 stretching at 1058.92 cm^{-1}, C=O stretching at 1631.78 cm^{-1}. IR spectrum of sodium acetate revealed absorption band at 1701.22 cm^{-1}, for C-O it showed absorption band at 1020 cm^{-1}. These are in good agreement with published data.

IR bands were observed to be significantly changed in the cocrystal as compared to the pure drug and coformer. These alterations were manifested in peaks corresponding to NH stretch which was then observed at 3415.94 cm^{-1}(shifted from 3390.86 $cm^{-1}$to 3415.94 cm^{-1}), a shift of C=O group was observed from 1631.78 cm^{-1} to 1647.21 cm^{-1}. This indicates cocrystal formation as peak shifting is observed. The presence of shifting in vibrational frequencies of Amisulpride and Sodium acetate indicates the formation of the supramolecular hetero synthon of cocrystal.

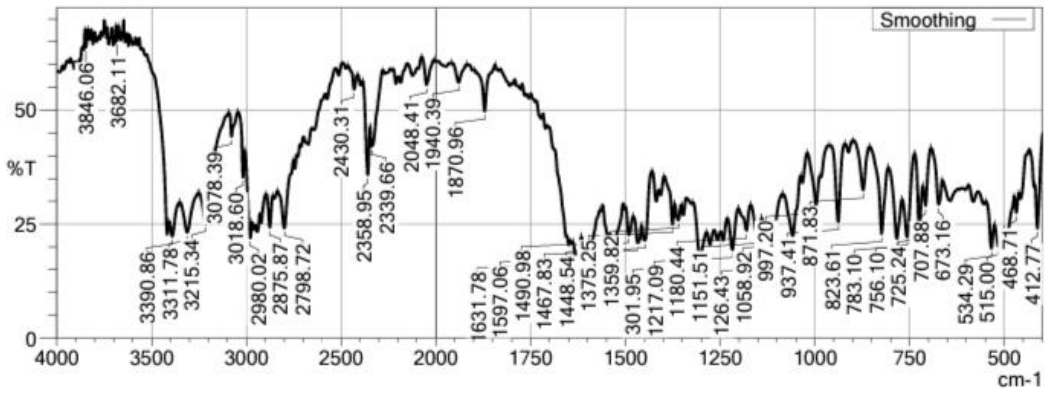


Figure No. 1: FTIR spectrum of Amisulpride (drug)

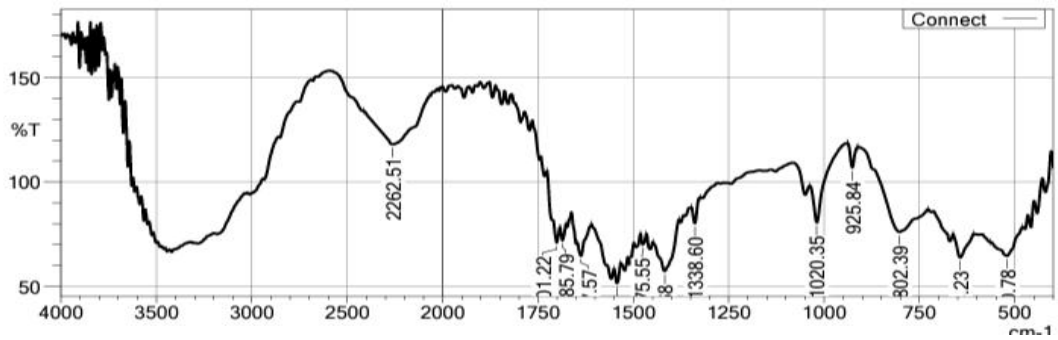


Figure No. 2: FTIR spectrum Sodium acetate (coformer)

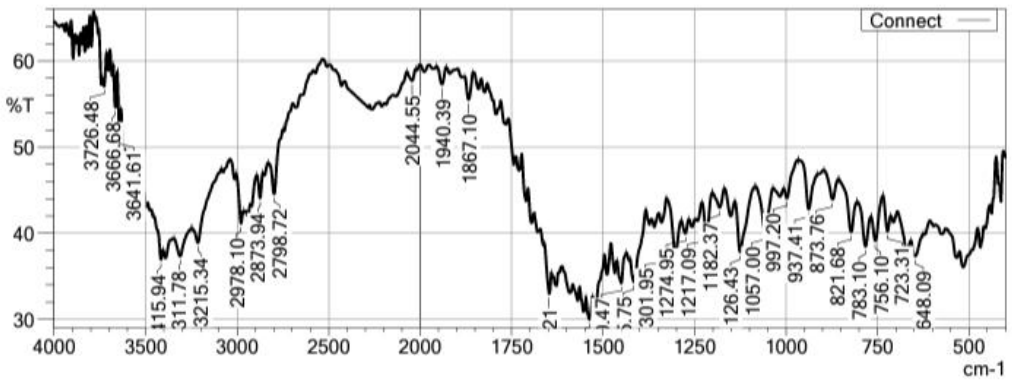


Figure No. 3: FTIR of Amisulpride-Sodium acetate cocrystals

Drug content of cocrystals:

Drug content of cocrystals was found to be as shown in Table No.4.

Table No. 4: Drug content in cocrystals

Sample	% Drug content (Practically observed)*	% Drug content (Standard limit)
Amisulpride cocrystals	99.43±0.304	99.0 – 101.0

*Average of three determination Mean ± Standard deviation (SD).

Scanning electron microscopy (SEM):

The SEM images of Amisulpride (drug), sodium acetate (coformer), and Amisulpride-sodium acetate cocrystals are shown in Figure No. 4, 5, 6 respectively.

The SEM images of Amisulpride, sodium acetate, and Amisulpride-sodium acetate cocrystals were captured at different magnification as shown in Figure No. 8.15, 8.16, and 8.17 respectively. SEM images of cocrystals (Figure No. 8.17) showed distinctive and sharp crystals as compared to that of drug and coformer. The particles of Amisulpride-sodium acetate cocrystal demonstrated the difference in morphology with the Amisulpride and sodium acetate as initial components. The change in morphology may be due to the interaction between drug and coformer, which resulted in the modification in the crystal faces of initial components and hence that of the crystal morphology. Further, the generation of crystalline material was confirmed by recording X-ray powder diffraction of drug, coformer, and cocrystal.

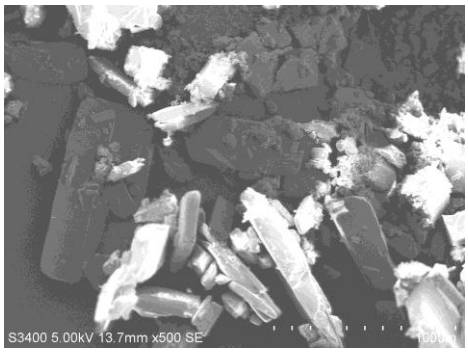


Figure No. 4: SEM image of drug (Amisulpride)

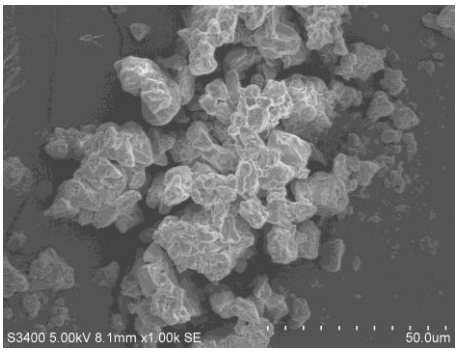


Figure No. 5: SEM image of coformer (Sodium acetate)

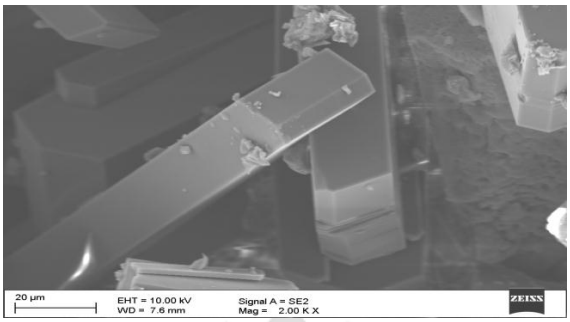


Figure No. 6: SEM image of Amisulpride- Sodium acetate cocrystals

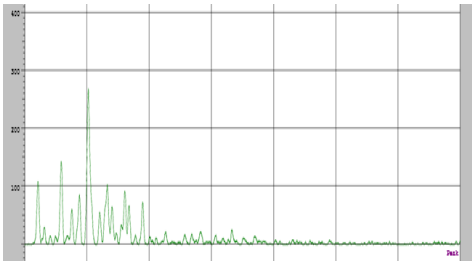
Powder X-ray diffraction (PXRD):

- The PXRD pattern of Amisulpride, sodium acetate, and Amisulpride-sodium acetate cocrystals are shown in Figure No.7, 8, 9 respectively. The diffractogram of Amisulpride showed characteristic peaks at different 2θ values (12.11, 15.85, 18.75, 20.23, 22.04, 23.14, 24.02, 26.08, 27.79, 28.94) indicating the crystalline nature (Figure No. 7).

- Also diffraction peaks obtained for Sodium acetate were 17.58, 22.6, 26.53, 29.5, 35.6 (2θ) values (Figure No. 8).

- The PXRD pattern of cocrystals was distinguishable from its components and some additional diffraction peaks were observed which did not exist in the pure drug and coformer. (2θ values- 11.89, 12.53, 16.0, 19.26, 20.89, 22.79, 23.16, 26.92, 30.03, 33.98, 37.81, 50.53, 52.14, 53.01) (Figure No. 9).

- The appearance of new diffraction peaks in the diffractogram shows the formation of co-crystals.



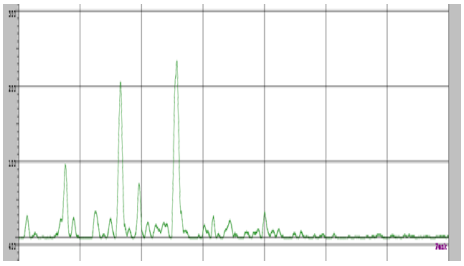


Figure No. 7: PXRD pattern of Amisulpride **Figure No. 8: PXRD pattern of sodium acetate**

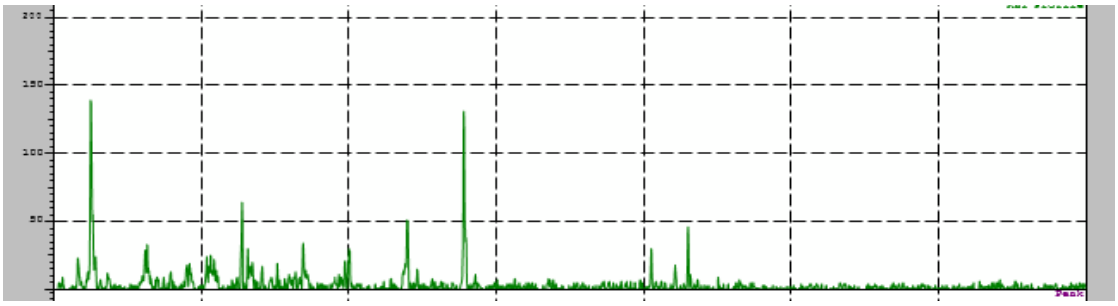


Figure No. 9: PXRD pattern of Amisulpride-Sodium acetate co-crystals

Formulation of fast dissolving tablets of Amisulpride cocrystal:

After the preparation of Amisulpride-sodium acetate cocrystals and its characterization, cocrystals were further subjected to the formulation of fast dissolving tablets. Fast dissolving tablets of Amisulpride cocrystals were successfully formulated and evaluated for various parameters.

Evaluation of pre-compression parameters: The developed formulations were subjected to evaluation of various pre-compression parameters before formulating into tablets, results are as depicted in Table No. 5. All formulations exhibited good flow properties.

Table No. 5: Results of pre-compression parameters

Parameters	Bulk density (gm/cm^2)	Tapped density (gm/cm^2)	Hausner's ratio	Compressibility index (%)	Angle of repose (θ)
F1	0.502±0.003	0.531±0.001	1.06±0.01	5.81±0.01	29.52±0.01
F2	0.494±0.005	0.518±0.002	1.046±0.01	5.0±0.01	29.23±0.012
F3	0.492±0.001	0.523±0.001	1.06±0	6.28±0.015	24.42±0.017
F4	0.495±0.005	0.52±0	1.05±0.01	5.75±0.017	22.59±0.01
F5	0.491±0.002	0.524±0.001	1.05±0.01	5.92±0.032	28.62±0.01
F6	0.59±0.01	0.637±0.001	1.05±0.007	5.81±0.018	29.62±0.02

The results are expressed as mean ± standard deviation (n=3).

Evaluation of post-compression parameters:

The developed tablet formulations were then subjected to various post-compression parameters and the results are depicted as shown in Table No. 6.

- All the formulated tablets were found to be of uniform weight with acceptable weight variation and thickness of tablets.

- The hardness of all formulations was maintained at 3.23-3.83 kg/cm^2.

- Friability was measured using Roche friability tester and friability loss was between 0.343-0.843 %.

- The hardness and friability studies revealed that tablets possess good mechanical resistance.

- The fast dissolving tablets showed drug content between 95.79-99.41 %.

- The disintegration time for formulation F1 to F6 was found to be in the range of 31.2 to 41.6 sec. The disintegration time was decreased with increasing concentration of superdisintegrant owing to sufficient swelling of tablet required for disintegration and wicking action of superdisintegrant.

- F2 batch was found to be promising as it exhibited the least disintegration time (31.2±0.58)

and wetting time (22.33±0.57), maximum water absorption ratio (97.33±0.917), and maximum drug content (99.41±0.265) as compared to the other batches (Table No. 6).

Table No. 6: Results of post-compression parameters

Parameters / batches	Weight variation (mg)	Hardness (kg/cm^2)	Thickness (mm)	Friability (%)	Wetting time (sec)	Water absorption ratio (%)	Drug content (%)	Disintegration time (sec)
F1	249.6± 1.52	3.5± 0.1	3.2± 0.1	0.680± 0.002	25.0 ± 1.0	91.33± 0.611	98.22± 0.23	35.0± 1.0
F2	249.6± 1.52	3.23± 0.152	3.56± 0.058	0.343± 0.020	**22.33± 0.57**	**97.33± 0.917**	**99.41± 0.265**	**31.2± 0.58**
F3	249.6± 0.115	3.83± 0.115	3.3± 0.1	0.843± 0.0026	31.0 ± 1.73	89.17± 0.355	95.79± 0.345	40.6± 1.15
F4	250± 1.0	3.4± 0.1	3.1± 0.17	0.441± 0.002	48.63± 0.55	85.84± 0.585	98.25± 0.064	37.0± 1.0
F5	249.8± 1.04	3.83± 0.214	3.33± 0.152	0.559± 0.0017	31.0 ± 1.0	82.0 ± 0.4	97.68± 0.069	41.6± 0.58
F6	250.6± 1.15	3.56± 0.115	3.2± 0.2	0.523± 0.015	25.16± 0.28	91.28± 0.186	99.21± 0.133	35.5± 0.61

The results are expressed as Mean ± Standard deviation (n=3).

***In-vitro* dissolution study:**

In-vitro drug release study of batches F1 to F6 was conducted. Out of which F2 batch showed maximum drug release 97.76 % in 14 min. Formulation F2 showed less disintegration time 31.2 sec. This might be due to a lower concentration of binder and a higher concentration of superdisintegrant. Hence F2 batch was considered as optimized formulation batch.

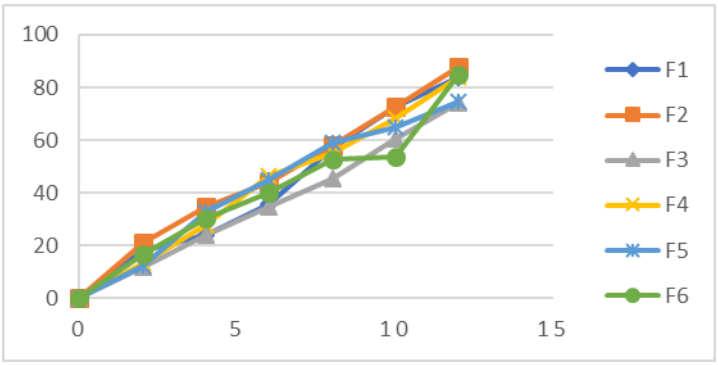


Figure No. 10: Cumulative % drug release (F1 to F6 bathes)

Kinetic data treatment:

Table No. 7: Kinetic data treatment

Formulation code	Zero order	First order	Higuchi model	Korsmeyer Peppas
	R^2	R^2	R^2	R^2
F2	0.9926	0.9098	0.946	0.9418

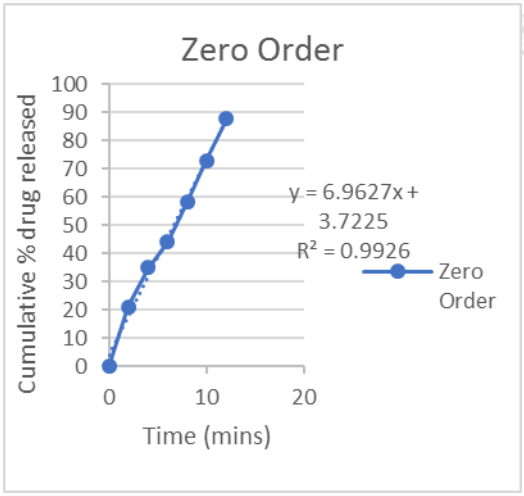


Figure No. 11: Zero-order kinetic representation of optimized batch (F2)

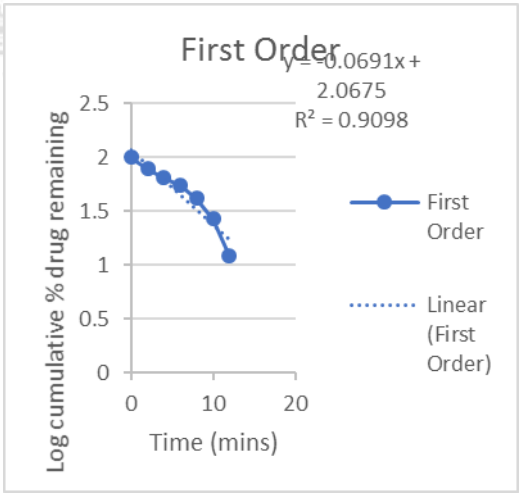
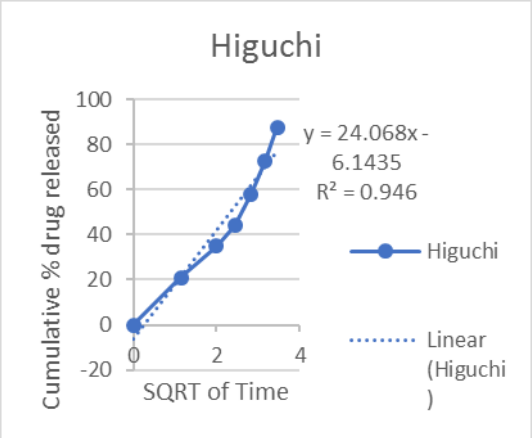


Figure No. 12: First order kinetic representation of optimized batch (F2)



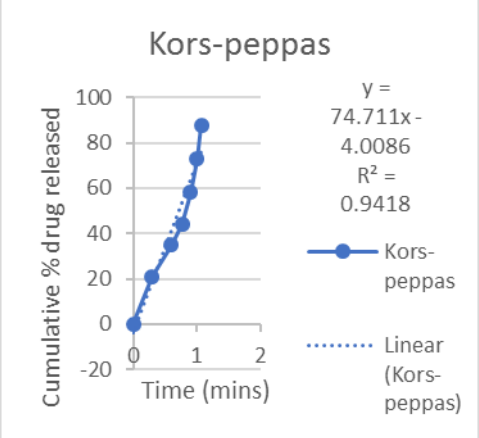


Figure No. 13: Higuchi kinetic representation of optimized batch (F2)

Figure No. 14: Korsmeyer Peppas kinetic representation of optimized batch (F2)

The optimized formulation (F2) batch follows Zero order kinetic and Higuchi equation having R^2 0.9926 and 0.946 respectively, which follows the super case II transport drug release mechanism.

CONCLUSION

The cocrystal of Amisulpride was prepared by using sodium acetate as a coformer molecule to improve the solubility and bioavailability of the drug. The solvent evaporation technique was used to prepare the cocrystals. Prepared cocrystals were further subjected to evaluation by various parameters. The formation of cocrystals was then confirmed by alteration in melting point, shifts in IR bands, and changes in 2θ values in XRPD spectra and mutually supported each other. There was 9.9 folds (1:2 ratio of drug & coformer respectively) increase in the solubility of cocrystals as compared to that of pure drug, which indicates the interaction of Amisulpride and sodium acetate and the formation of cocrystals. Fast dissolving tablets of Amisulpride were then formulated followed by pre-compression and post-compression evaluation of formulations. Based on the results, the F2 batch was found to be promising as it exhibited the least disintegration time (31.2±0.58 sec) and wetting time (22.33±0.57 sec), maximum water absorption ratio (97.33±0.917), and maximum % drug content (99.41 ±0.265) as compared to the other.

An *in-vitro* drug release study of batches from F1 to F6 was conducted. Out of which F2 batch showed maximum drug release i.e., 97.76 % in 14 min. This might be due to a lower concentration of binder (Polyvinyl pyrrolidone) and a higher concentration of superdisintegrant (Croscarmellose sodium). Hence, the F2 batch was considered as optimized

formulation batch. It follows the Zero order kinetic model and Higuchi equation with the super case II transport mechanism.

Hence, Amisulpride cocrystals possessing modified physicochemical properties were obtained and formulated into Fast dissolving tablet.

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