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FORMULATION AND IN-VITRO EVALUATION OF ORO-DISPERSIBLE TABLET OF ACETOAMINOPHEN MODEL DRUG BY USING SPRAY DRYING TECHNIQUE

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ABSTRACT
Present study was carried out with to mask the bitter taste of Acetoaminophen by spray drying technique with help of NISSO-Nipon (L-HPC). The disintegrate the tablet as quick as possible to improve the dissolution of the drug. To develop a physically and chemically stable ODT employing suitable technique i.e., spray drying and evaluate the formulation of Acetoaminophen oral dispersible tablets hence confirmation of better formulation. The ODT Tablets characterized by FTIR, UV, solubility study, dissolution studies in different models.

KEYWORDS: Spray Drying Technique, UV, FTIR, Dissolution Studies, Kinetic Models.

INTRODUCTION

These dosage forms rapidly disintegrate and/or dissolve to release the drug as soon as they come in contact with saliva, thus obviating the need for water during administration.[1,2,3,4,23] The aim of the present work is to formulate, develop and evaluate Acetoaminophen ODT using Co-processed diluents and Spray drying technique. The reason behind using these techniques was to maintain both hardness and disintegrating time of the dosage form so that it can withstand its mechanical strength while transportation.[4,5,6,7] The Acetoaminophen Model drug was selected for formulating oral dispersible tablet because the patients suffering from severe vomiting would get quick onset of action.[9,10,11,12,50]

MATERIAL AND METHODS

Material

The few materials such as drug and excipients it was obtained as gift sample from following industry. The Remaining was obtained as analytical grade from laboratory. The Model drug of Acetoaminophen (Acetoaminophen) was kindly provided by Research Lab and the excipients like Mannitol, Lactose, Magnesium stearate was provided by Lobachemie, Sodium starch glycolate obtained from Holden Pharmaceutical Laboratories Pvt. Ltd, L-HPC from Nipon Lab. (NISSO) and the H_2SO_4, NaOH, Cerric Ammonium Sulphate, HCL, Ferrion Solution, Ethanol (99.9%) purchased through S.D. fine chemicals and Spray dryer (Lab ultima LU 222 Advanced), HPLC (water 600 controller), FT-IR Spectrophotometer (Bruker, Alpha), Dissolution Apparatus (Electrolab, TDT-08L), Water heater cum shaker bath (Classic Scientific), Digital weighing Balance (Shimadzu, AUX220).

Experimental

1. Preformulation study

The preformulation testing is the first step in rational development of any dosage forms of a drug substance.[8,13,14,15,16,25] Preformulation study is the process of optimizing the delivery of drug through determination of physicochemical properties of the new compound that could affect drug performance and development of an efficacious, stable and safe dosage form. It gives the information needed to define the nature of the drug substance and provide a framework for the drug combination with pharmaceutical excipients in the dosage form. Hence, preformulation studies were performed for the obtained sample of drug for identification and compatibility studies.[17, 18,23]

2. Characterization of drug candidate[13]

2.1 Identification of acetoaminophen

The sample of Acetoaminophen obtained was subjected to identification by its melting point, solubility, IR, UV, and Differential Scanning Calorimetry thermogram determination.[13,19,20]

2.2. Melting point

The melting point of drug was determined by Melting point apparatus using capillary method. The observed value was compared with the reported value.[13,21,22,23,50]

2.3 Solubility

Solubility of the drug is one of the considerations in Oro-dispersible tablet formulations. Solubility was determined by dissolving pure drug in various solvents like water, alcohol, acetone & dichloromethane.[23,24,25,30]

2.4 Infrared absorption spectrophotometry

The drug is determined by infrared absorption spectrophotometry by using FTIR. The spectrum was compared with that obtained with Acetoaminophen with the reference spectrum of Acetoaminophen.[13,50]

2.5 UV Identification/Determination

The drug was dissolved 10 mg in sufficient ethanol to produce 100 ml. Then take 1ml of stock solution and make up with buffer having pH 6.8 up to 10ml. The resulting solution was protected from bright light and immediately absorbance was measured at the maximum at about 257nm; absorbance at 257nm.[13,26,27,28,30,45,50]

2.6 Loss on drying

It was determined on 1.5 g by drying in an oven at 105º. It was found not more than 0.40 %w/w.[31,32,33,35,50]

2.7 Assay (By Titration Method)[34,36,38,50,52]

The sample was weighed accurately about 0.5 gm; dissolved in a mixture of 10 ml of water and 50 ml of 1 M sulphuric acid. It was then boiled under a reflux condenser for 1 hour, cooled and dilute to 100 ml with water to 20.0 ml of the solution 40 ml of water was added, then 40 g of water in the form of ice, 15 ml of 2 M hydrochloric acid and 0.1 ml of ferroin solution was added and it was titrated with 0.1 M ceric ammonium sulphate until a yellow color was produced. A blank titration was also carried out.1 ml of 0.1 M ceric ammonium sulphate is equivalent to 0.00756 g of $C_8H_9NO_2$.[34,36,38,52]

2.8 Calibration curve of Acetoaminophen in Phosphate Buffer pH 6.8[28,53]

The standard stock solution was prepared by dissolving Acetoaminophen in phosphate buffer pH 6.8 to make final concentration of 100 µg/ml (100ppm). Different aliquots were taken from stock solution and diluted with phosphate buffer pH 6.8 separately to prepare series of concentrations from 3-18 µg/ml. The λmax was found to be 243nm from UV spectrum of Acetoaminophen in phosphate buffer pH 6.8, during scanning from 200-400 nm. Absorbance was measured at 243nm against phosphate buffer pH 6.8 as blank on UV-Visible Spectrophotometer (shimadzu1800). The observations were recorded and the calibration curve was prepared by plotting absorbance versus concentration of Acetoaminophen.[37,39,40,41,53]

3. Drug-excipients compatibility study[28]

A compatibility study was carried out with potential formulation excipients to determine drug- excipients interaction.[28,42,44] All the physical mixtures of drug and excipients in 1:1 and 1:0.5 ratio on the basis of formula ratio and for drug and lubricant or glidant in 20:1 was kept under compatibility study for 14 days at 55°C in glass vials sealed. The physical mixtures were taken in same ratio as that of actual formulation ratio and were observed physically like Caking, Liquefaction, Discoloration, and Odor or gas formation just observations was evaluated and obseverd. Physical observations for any change in appearance were recorded. Refer Table No.3

4. Description of techniques used for odt preparation[43,45,46]

4.1 Formulation of Oro-dispersible tablet by spray drying technique

4.1.1 Spray drying step

In this step appropriate solvent for the excipients is chooses in which it is soluble to obtained solution for spray drying. The solution was allowed to run through the pump into drying chamber by selecting correct processing parameters to obtain the product in cyclone.[46,47] the solution of HPC-L (NISSO) was used to prepared solution spray dried (10%w/w) aqueous dispersion was prepared. Refer Table No. 4.

4.1.2 Compression step

The obtained product from spray drying mixed with drug, super-disintegrant, sweetner, lubricant and glidant. It was triturated to obtained uniform particle size and passed through mesh 20# ASTM. The Finally compressed into tablet by keeping appropriate hardness.[48,49,50] The hardness for Oro-dispersible tablet is always kept low than conventional tablet in order to meet the minimum disintegration time but also friability within the limit. Refer Table No. 6 & 7.

5. Evaluation of prepared oro-dispersible tablets[13, 27,29]

The evaluation tablet's properties are important in the determination of product quality. There are various standards that have been set in the various pharmacopoeias regarding the quality of pharmaceutical tablets.[13,27,28] These include the diameter, size, shape, thickness, weight, hardness, disintegration and dissolution characteristics. The diameters and shape depend on the die and punches selected for the compression of tablets. The following standards or quality control tests were carried out on compressed tablets of all formulation batches.[51,52,53]

5.1 Appearance

The general appearance of a tablet involves tablet's size, shape, color, odor, taste, surface texture, consistency, and presence of any identifying markings.[13,27,28,52]

5.2 Thickness and Diameter

The thickness and diameter of individual tablets was measured using Vernier caliper. Tablet thickness should be controlled within ± 5% variation of a standard value.[13,50]

5.3 Weight variation

Twenty tablets were selected at a random and average weight was determined. Then individual tablets were weighed and was compared with average weight. According to I.P., not more than two of individual weights deviate from the average weight by more than stated % and none deviates by more than twice that relevant percentage.[13,53]

5.4 Hardness

The limit of crushing strength for an ODT is usually kept low so as to facilitate early disintegration in the mouth. Tablet hardness means its diametric crushing strength (Fc) was measured by using Monsanto tablet hardness tester or Pfizer.[13,53]

5.5 Friability

Friction and shock are the forces that most often cause tablets to chip, cap or break. The friability test is closely related to tablet hardness and is designed to evaluate the ability of the tablet to withstand abrasion in packaging, handling and shipping. Friability of the tablets was determined using Roche Friabilator (Labin LI –FT-1). Usually it should be below 1%, an indication of good mechanical resistance of tablets. Pre-weighed sample of tablets was placed in the friabilator and subjected to 100 revolutions (25 rpm). The tablets were de-dusted using a soft muslin cloth and reweighed.[13,53]

The friability (f) is given by the formula,

$$f = (1 - \frac{W_o}{W}) \times 100$$

Where, Wo = weight of the tablets before the test

W = weight of the tablets after the test.

Usually, it should be below 1%, an indication of good mechanical resistance of tablets.

5.6 In-vitro disintegration time[13,53]

The disintegration time of Oro-dispersible tablets was determined in conventional disintegration test apparatus (Electrolab ED-2-L) in accordance with the official European Pharmacopoeia monograph 'Oro-dispersible tablets' stating a maximum disintegration time of 5 min. Disintegration or more specifically dispersion times were measured in 900 ml purified water according to the I.P. method without using disc at room temperature (25°C ± 2°C).

5.7 Water Absorption Ratio / Wetting Time[53]

Wetting time of dosage form is related with the contact angle. Wetting time of the Oro-dispersible tablet is another important parameter, which needs to be assessed to give an insight into capillarity and subsequently the disintegration properties of the tablets; a lower wetting time implies a quicker disintegration of the tablet.[53] Wetting time of dosage form is related with the contact angle. A lower wetting time implies a quicker disintegration of the tablet.

A piece of tissue paper folded twice was placed in a small petri dish containing 6 ml of water. A tablet was put on the tissue paper and allowed to wet completely. The wetted tablet was then reweighed. Water absorption ratio, R was determined using following equation,

$$R = 100 \times \frac{W_a - W_b}{W_b}$$

Where, Wa= weight of tablet after water absorption and Wb= weight of tablet before water absorption.

5.8 Dissolution Study for Acetoaminophen ODT[53]

Dissolution profiles of Acetoaminophen ODTs were determined using the USP type II apparatus (Electrolab TDT-2L) with paddle speed at 50 rpm. Dissolution was performed in 900 ml in Phosphate buffer pH 6.8 maintained at 37 ± 0.5°C. Five milliliters of samples were withdrawn at specified time intervals. The volume of dissolution fluid was adjusted to 900 ml, by replacing each 5 ml aliquot withdrawn with 5 ml of Phosphate buffer pH 6.8, pre-warmed at 37 ± 0.5°C. Samples withdrawn were filtered through Whatman filter paper, suitably diluted with Phosphate buffer pH 6.8, and analyzed at 243nm, using UV-Visible double beam spectrophotometer (shimadzu1800).

6. Drug release kinetic study[53]

To analyze the mechanism of release and release rate kinetics of the dosage form, the data obtained were fitted into Zero order, First order, Higuchi matrix, Korsrmeyer Peppas model. The release kinetic studies were performed on formulation batch. Based on the R-value, the best-fit model was selected. The linearity of the plots was obtained from the value of regression coefficient (R^2). The model with the highest linearity (R value approaches unity) was chosen as the best-fit kinetic model.

6.1 Zero order kinetics[53]

Drug dissolution from pharmaceutical dosage forms that do not disaggregate and release the drug slowly, assuming that the area does not change and no equilibrium conditions are obtained can be represented by the following equation,

$$\mathbf{Q_t = Q_o + Ko\ t}$$

Where,

Q_t is amount of drug dissolved in time t, Q_o is initial amount of the drug in the solution and Ko is zero order release constant.

6.2 First order kinetics[53]

To study the first order release rate kinetics, the release rate data were fitted to the following equation,

$$\mathbf{Log\ Q_t = log\ Q_o + K_1\ t/2.303}$$

Where,
Q_t is the amount of drug released in time t, Q_o is the initial amount of drug in the solution and K_1 is the first order release constant.

6.3 Higuchi model[53]
Higuchi developed several theoretical models to study the release of water soluble and low soluble drugs incorporated in semisolids and/or solid matrices. Mathematical expressions were obtained for drug particles dispersed in a uniform matrix behaving as the diffusion media. And the equation is,

$$Q_t = K_H \cdot t^{1/2}$$

Where,
Q_t is amount of drug released in time t, K_H is Higuchi dissolution constant.

6.4 *Korsmeyer and Peppas release model*[53]
To study this model the release rate data are fitted to the following equation,

$$Mt / M\infty = K \cdot t^{n}$$

Where,
Mt / M∞ is the fraction of drug release, K is the release constant, t is the release time and "n" are the diffusional coefficient for the drug release that is dependent on the shape of the matrix dosage form.

7. Stability study[34, 53]
Stability of a drug has been defined as the ability of a particular formulation, in a specific container, to remain within its physical, chemical, therapeutic and toxicological specifications. The purpose of stability testing is to provide evidence on how the quality of a drug substance or drug product varies with time under the influence of a variety of environmental factors such as temperature, humidity and light and enables recommended storage conditions, re-test periods and shelf lives to be established. Optimized batch was selected for stability study. The Acetoaminophen tablet batch stored at temperature of 40°C ± 2°C / 75 % RH ± 5 % RH. The products were stored for a period of 3 months in the above-mentioned conditions. The product was analyzed for the changes in physical appearance, weight variation, friability, hardness, In-*vitro* drug release after intervals of one month up to three months.

RESULT AND DISCUSSION
Preformulation study
Preformulation testing is the first step in the rationale development of dosage forms. Preformulation testing encompasses all studies with drug in order to produce useful information for subsequent formulation of stable and suitable dosage form.

8. Characterization of drug (Acetoaminophen)
The characterization of drug is necessary for identification and purity of drug. In characterization of drug different physical, chemical and spectroscopic tests were performed which are given below.

8.1 Identification test
8.1.1 IR spectroscopy
IR spectra interpretation study was performed for the identification of Acetoaminophen. Refer Table No. 1**.**

FT-IR study is important for determination of functional groups present in structure of sample. The IR spectrum of the pure Acetoaminophen sample was recorded by FT-IR spectrometer as shown in Table 1. The major peaks observed and corresponding functional groups are also given in Table No.1 and Figure No.1

8.1.2 UV spectroscopy
8.1.2.1 Determination of absorption maxima
The absorption maxima of Acetoaminophen in water were determined using double beam UV spectrophotometer. The λ_{max} of Acetoaminophen in buffer pH 6.8 was found to be 257 nm. The λ_{max} for Acetoaminophen of 10 ppm solution is shown in following figure. Refere Figure No. 2

8.1.2.2 Calibration curve of Acetoaminophen
The standard calibration curve of Acetoaminophen was carried out in buffer pH 6.8 and found to be linear in the concentration range of 5-30 µg/ml. The observed absorbance showed in the above figure. Refer Figure No. 3 and regression coefficient was 0.999. Refer Absorbance and concentration Table No. 2

8.1.3 Physicochemical study
8.1.3.1 Organoleptic characterization
The organoleptic properties determined by the senses including sight, smell & touch. Acetoaminophen was found to be white crystalline powder. The organoleptic properties of Acetoaminophen were found to be same as that specified in the standards.

8.1.3.2 Solubility study
The solubility study of Acetoaminophen was carried out. The Acetoaminophen was found to be freely Soluble in ethanol, Acetone, sparingly soluble in water etc. and it was concluded that it passes solubility test.

8.1.3.3 Melting point determination
The melting point of Acetoaminophen was found to be 168 ºC -171ºC and standard melting point was 169 ºC - 170 °C.

8.1.3.4 Loss on drying
The loss on drying for Model Drug Acetoaminophen sample was found to be 0.40 % which was within the limit of IP specification that is NMT 0.5%.

9. Compatibility study

Compatibility studies for Acetoaminophen with all excipients were carried out prior to formulation of Rfere Tablet No. 3.

9.1 Preformulation study for blend materials

All the batches were found to be a fair flow property. All the formulations were shown reproducible result in terms of flow property of powders. Refer Table No. 6

9.2 Post compression characterization (Prepared ODT)

For the five batches the evaluation parameters for Hardness, friability, and disintegration time hence for details Rrefer Table No. 7.

Final Discussion

1. It was seen that the formulation of Oro-dispersible Acetoaminophen tablet by spray drying technique was done. And taste masking was done properly.
2. The taste masking was evaluated by the solubility testing.

9.3 Drug release profile

The result of dissolution study was showed in the following Refer Table No. 8 and Figure No. 4.

9.3.1 Justifications of drug release profile

1. After studying drug release, it was concluded that faster disintegration has a direct effect on dissolution.
2. Optimized batch F3 showed % of drug release from the dosage form at 2 min. interval and after 15 minutes interval 95% of drug was released from the dosage form.
3. Dissolution studies for comparative evaluation of marketed and fast dissolving tablets were conducted and showed differences between release rates.
4. Tablets containing the physical mixtures of mannitol and microcrystalline cellulose with camphor showed faster drug release which might be attributed due to increase in porosity as compare to marketed one. The kinetic models study refers figure no. 5, 6, 7, 8 and 9.

9.3.2 Justification regression coefficient

Drug release kinetics study indicates that drug release from tablet follows Peppas model according to regression coefficients (r^2) value. Refer Table No. 9.

TABLES

Table No. 1: IR spectra interpretation of acetoaminophen model drug.

Wavelength (cm^{-1})	Groups present
1731.30	C=O (S)
2966.00	N-H (B)
3315.81	N-H (B)
3677.75	O-H (S)

Table No.2: Absorbance at different concentrations.

Sr. no.	Concentration (µg/ml)	Absorbance (257 nm)
1	5	0.198
2	10	0.325
3	15	0.490
4	20	0.655
5	25	0.827
6	30	0.988

Table No. 3: Compatibility study after 14 days.

Physical mixture	Observations			
	Color change	Cake formation	Liquefaction	Gas formation
Acetoaminophen	No	No	No	No
Drug + HPC-L	No	No	No	No
Drug + SSG	No	No	No	No
Drug + Lactose	No	No	No	No
Drug + Xylitol	No	No	No	No
Drug + Aerosil	No	No	No	No
Drug + Mg. Stearate	No	No	No	No

Table No. 4: preperation of dispersion (10% w/w) for 1000 units.

Sr. No.	Name of Ingreddients	Mg/Tab	Gm/Kg
1.0	Acetoaminophen	500.00	500.00
2.0	HPC-L	10.00	10.00
3.0	Purified Water	QS	4590.00
Total Weight of Granules To be Compensate (mg)		510.00	510.00

Table No. 5: Formulation & Development Design Feasibility Trials of Acetoaminophen (Trial & Error Basis Experimental Design).

Name of ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9
Acetoamonophen (Granules)	510	510	510	510	510	510	510	510	510
Lactose Anhydrous 21 AN	50	50	50	50	50	50	50	50	50
Sodium Starch Glycolate	15	15	15	20	20	20	25	25	25
HiCel ™ 90M (MCC)	160	165	170	160	165	170	160	165	170
Aerosil 200 Pharma	10	10	10	10	10	10	10	10	10
Xylitol	5	5	5	5	5	5	5	5	5
Mgnesium Stearate	5	5	5	5	5	5	5	5	5
Total Weight (mg)	**755**	**755**	**755**	**755**	**755**	**755**	**755**	**755**	**755**

Table No. 6: Pre-compression characteristics of formulations.

Codes	Bulk Density (g/ml)	Tapped Density (g/ml)	Carr's Index (%)	Hausner's Ratio	Angle of Repose (θ)
F1	0.55	0.64	14.06	1.16	34.9
F2	0.54	0.63	14.29	1.17	35.5
F3	0.43	0.53	18.87	1.23	33.2
F4	0.42	0.58	27.59	1.38	32.7
F5	0.50	0.56	10.71	1.12	32.5
F6	0.51	0.65	21.54	1.27	31.0
F7	0.48	0.59	18.64	1.23	30.2
F8	0.53	0.62	14.52	1.17	32.2
F9	0.58	0.68	14.71	1.17	31.9

Table No. 7: Post-compression before sublimation characteristics of formulations.

Formulation	Hardness (Kg / cm^2)	Friability (%)	Thickness (mm)	Disintegration time (sec)	Weight variation (mg)	Wetting time (sec)
F1	3.8	0.42	2.9	25	1.05	3.6
F2	3.9	0.43	2.9	30	1.04	3.3
F3	4.5	0.35	2.8	12	1.00	2.3
F4	4.2	0.41	2.8	25	0.98	2.6
F5	4.1	0.48	2.8	28	1.02	2.5
F6	3.8	0.42	2.8	25	1.02	1.8
F7	3.5	0.42	2.8	60	0.98	4.3
F8	3.9	0.43	2.9	55	1.03	3.8
F9	3.9	0.45	2.8	48	0.98	3.5

Table No. 8: Dissolution Profile for Prepared ODT Formulations.

Sr. No.	Time (Min)	Cumulative % Drug Release								
		F1	F2	F3	F4	F5	F6	F7	F8	F9
1	5	38.23	29.12	20.52	29.56	35.22	46.22	48.38	16.23	39.56
2	10	53.36	43.50	29.12	33.66	49.25	65.95	69.28	28.10	62.96
3	15	75.11	49.25	53.25	58.10	56.15	69.26	72.95	52.25	69.25
4	20	85.33	76.61	63.75	82.80	73.21	86.17	86.17	65.75	82.87
5	25	91.02	94.25	91.87	92.87	87.17	94.87	96.29	84.08	96.29
6	30	95.75	98.50	97.28	95.64	98.45	99.78	99.28	94.08	99.28

Table No. 9: Regression coefficients of all release kinetic models.

Regression Coefficients (R^2)				
Zero-Order	**First-Order**	**Higuchi Model**	**Hixson Crowell Model**	**Peppas Model**
0.895	0.959	0.891	0.914	0.995

FIGURES

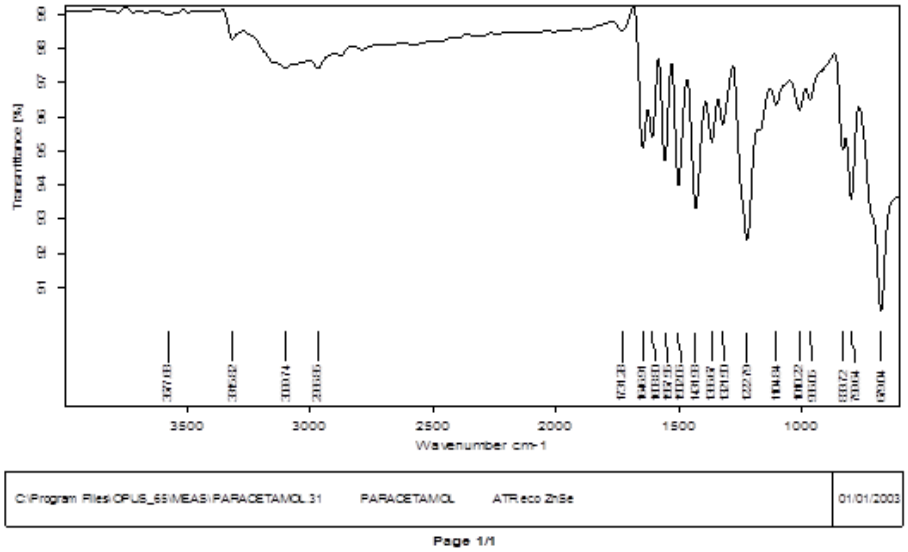

Figure No. 1: IR spectra of Acetiaminophen Model Drug.

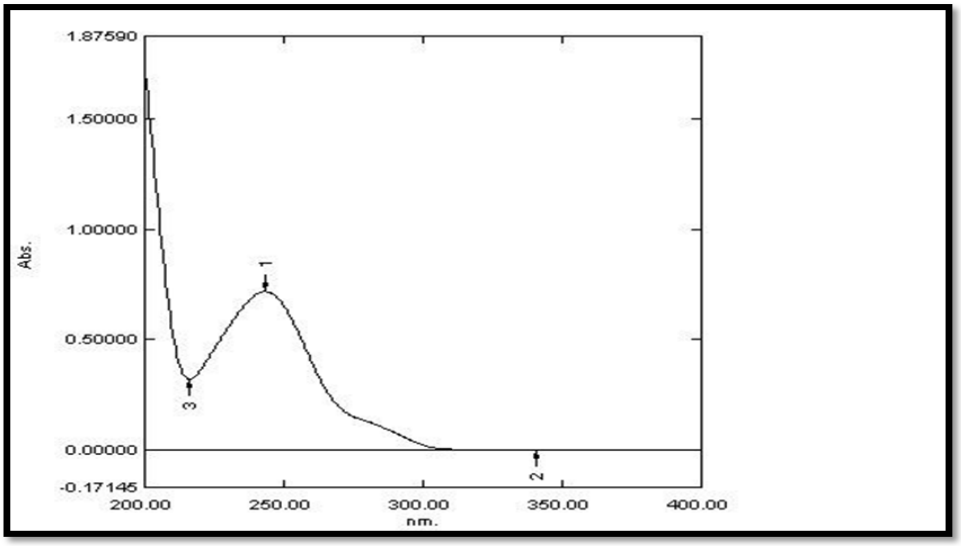

Figure No. 3: UV Spectrum of Acetoaminophen Model Drug.

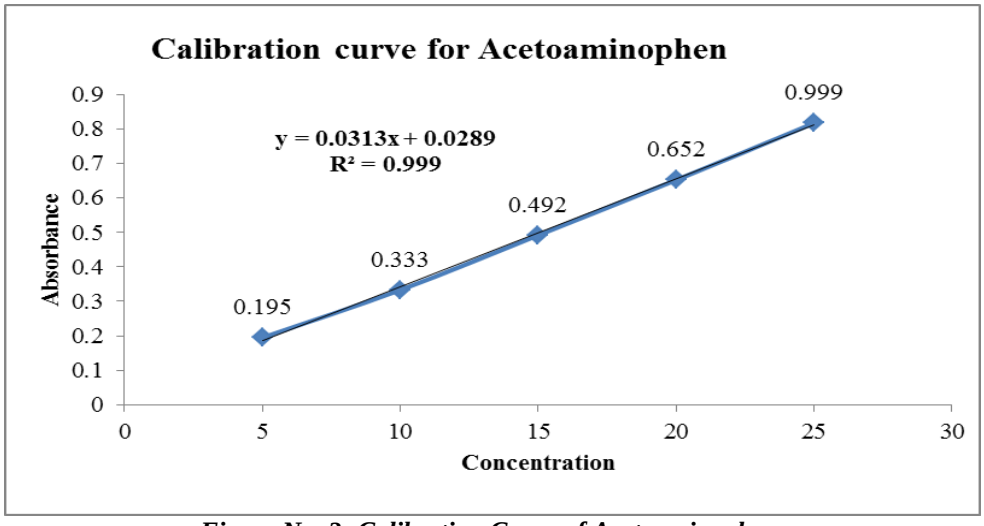

Figure No. 3: Calibration Curve of Acetoaminophen.

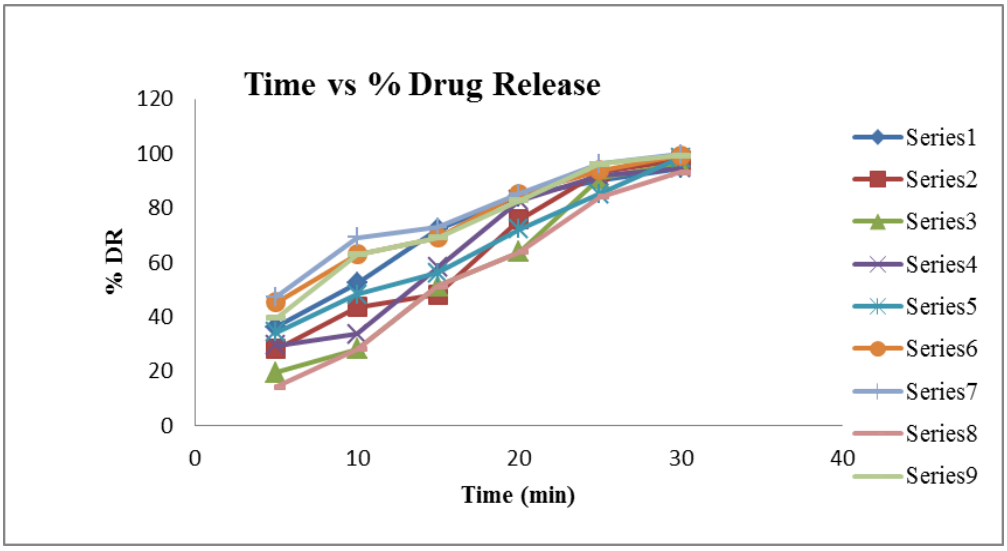

Figure No. 4: Combine Drug Release Profile of Formulations.

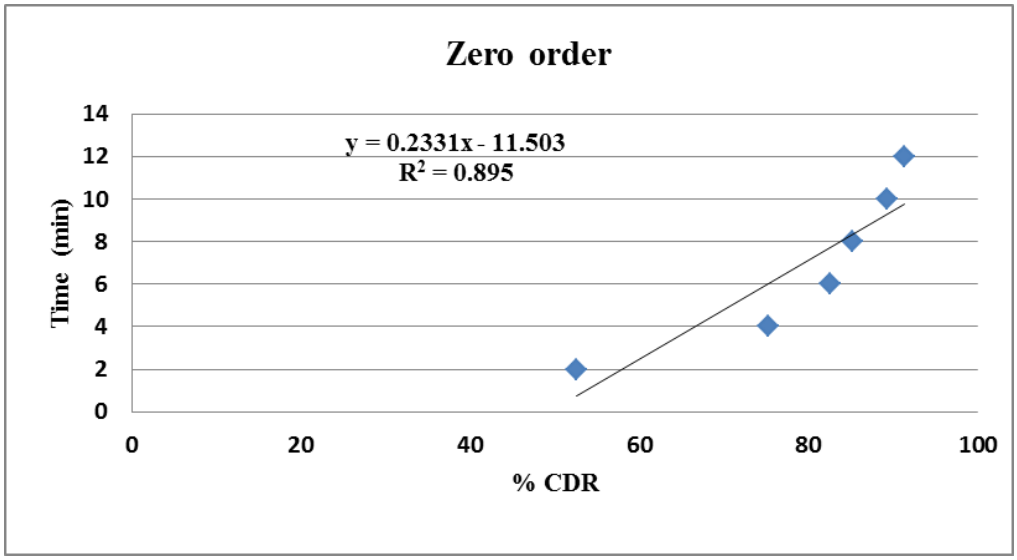

Figure No. 5: Release kinetics of Zero Order Model.

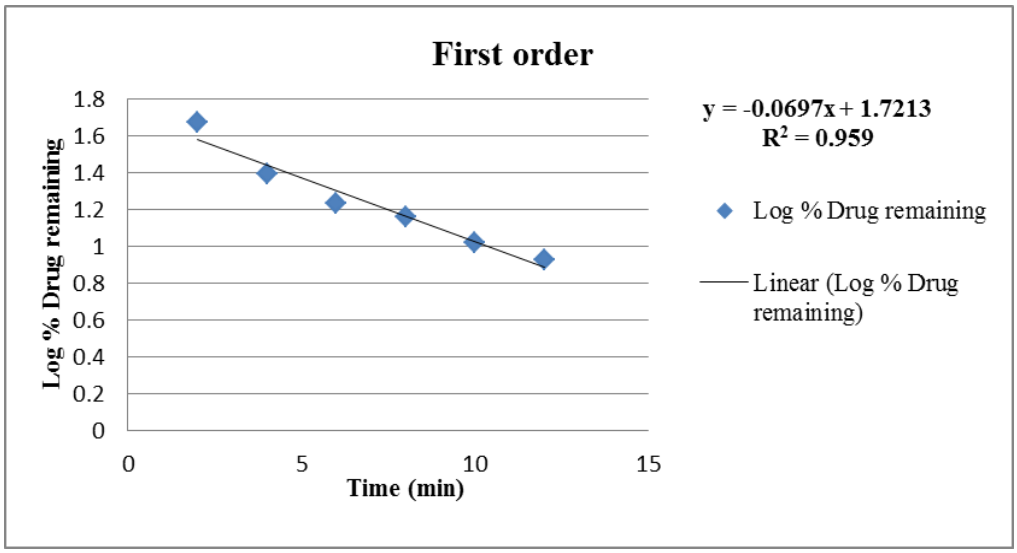

Figure No.6: Release Kinetics of First Order Model.

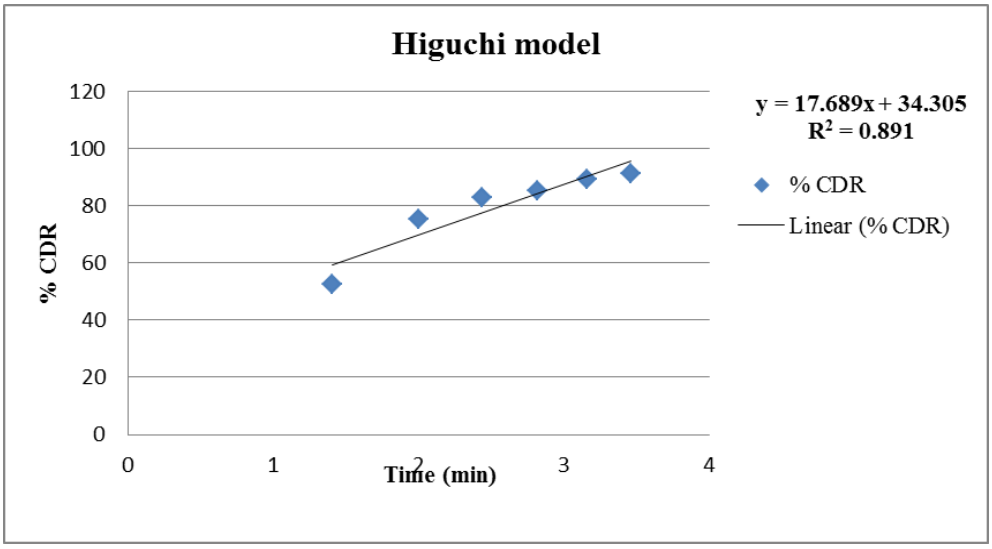

Figure No. 7: Release Kinetics of Higuchi Model.

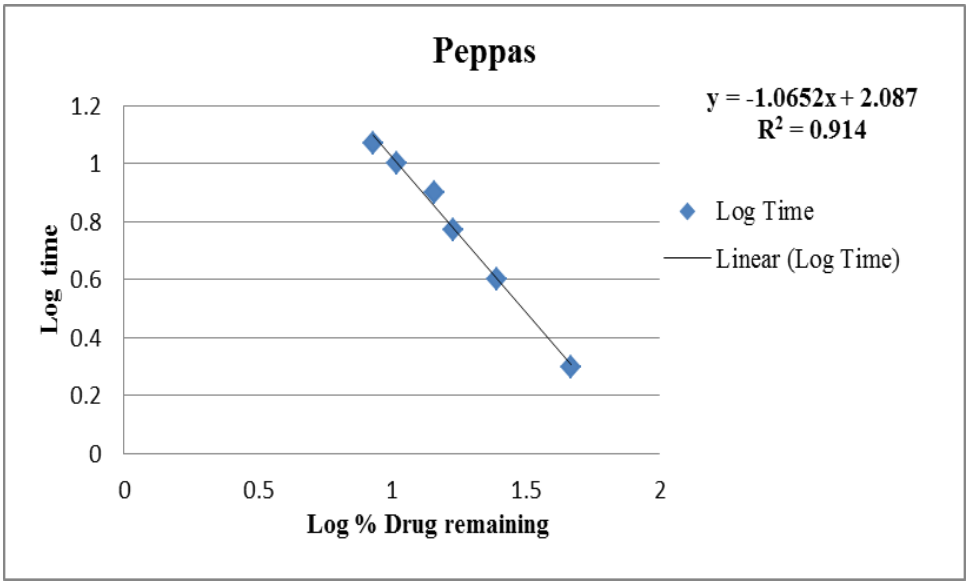

Figure No. 8: Release Kinetics of Peppas Model.

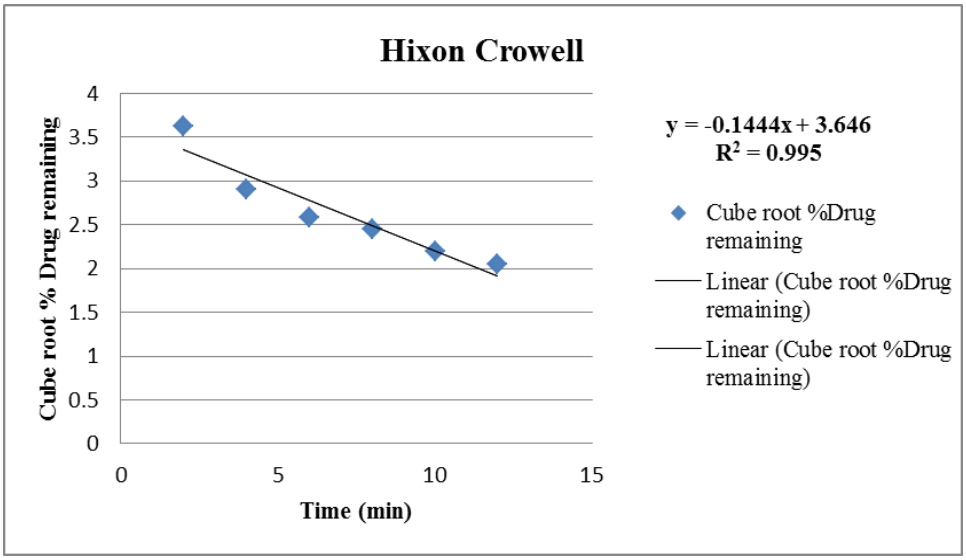

Figure No. 9: Release Kinetics of Hixon Crowell Model.

CONCLUSION

The aim of the present work is to formulate, develop and evaluate Acetoaminophen ODT using co processed diluents and sublimation technique. Reason behind using this both techniques was to maintain both hardness and disintegrating time of the dosage form so that it can withstand its mechanical strength while transportation. Antiemetic drug Acetoaminophen was selected for formulating oral dispersible tablet because the patients suffering from severe vomiting would get quick onset of action.

1. Preliminary trails for super disintegrants and co processed diluents were performed.
2. From preliminary trails crospovidone as super-disintegrant and co-processed MCC (HiCel ™ 90M) were selected with ratio of 1:4.
3. Post compression study was carried out for each and every formulation amongst all the batches, batch F3 showed good results with hardness 4.5 kg/cm^2 and disintegrating time 12 sec. and selected as an optimized batch. The result of batch F3 was compared with marketed ODT (Perinorm) has shown better results for hardness DT, and friability.
4. The *in-vitro* disintegration study reveals that ODT disintegrates within 12 seconds which is good indication for its rapid drug delivery.
5. The *in-vitro* dissolution study shows the drug release with 95 % in 15 min.
6. It was observed from that the mannitol crystals are fine and uniformly distributed in the microcrystalline matrix in spray dried form compared to physical mixture of the same combination this mechanism helps to improve compressibility and disintegrating time.
7. The fast disintegration may be due to the partial amorphization and formation of submicron particles of mannitol and due to sublimation method. And hardness was maintained due to typical plastically deformed characteristics of MCC (HiCel ™ 90M). Finally, it was concluded that using co processed MCC (HiCel ™ 90M) improved compressibility of the tablet to with stand its mechanical strength and incorporation of HPC-L & API Sprayingformed porous structure in the tablet aid to easy penetration of fluid reducing disintegrating time.

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