CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187

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

FORMULATION AND OPTIMIZATION OF FAST DISSOLVING TABLET OF TERBUTALINE SULPHATE BY NOVEL CO-PROCESSING

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Article Received: December 2021 **Accepted:** December 2021 **Published:** January 2022

Abstract:
The present study was to formulation and optimization of fast dissolving tablet of terbutaline sulphate by novel co-processing, Terbutaline sulphate tablets containing co-processed superdisintegrants exhibited quick disintegration and improved drug dissolution. This formulation is more cost effective than aerosol inhalation pumps available. It was found that the total maximum amount of drug from the optimised batch was released in first 4 minutes of the dissolution study. The tablets disintegrated within 50 sec under experimental in vitro laboratory conditions. It can be concluded from the present work that co-processed superdisintegrants of crospovidone and croscarmellose are superior to physical mixture of crospovidone and croscarmellose used in Terbutaline sulphate fast dissolving tablets.

Keywords: *Superdisintegrants, co-processing, disintegration time, excipients, capillary*

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Please cite this article in press Mahendra sahu et al, ***Formulation And Optimization Of Fast Dissolving Tablet Of Terbutaline Sulphate By Novel Co-Processing.,*** *Indo Am. J. P. Sci, 2022; 09(01).*

INTRODUCTION:

The development of an appropriate dosage form for older people, children, bed ridden patients, mentally retarded, uncooperative, nauseated patients has been widely desired as it become difficult for these patients to swallow conventional tablets (Kremzar L. *et al*, 1998) Despite of tremendous innovations in drug delivery, the oral route remains the preferred route for administration of therapeutic agents because of accurate dosage, low cost therapy, self-medication, non-invasive method and ease of administration, leading to high level of patient compliance (Kremzar L *et al*, 1998, Hanawa T, 1995). To the make the best use of oral cavity we are going for ODTs production to ensure that maximum absorption via mucous membrane.

A fast-dissolving drug delivery system, in most cases, is a tablet that dissolves or disintegrates quickly in the oral cavity upon the contact with saliva, and resulting in solution or suspension of the administered medicine. FDT dosage forms, are also commonly known as fast melt, quick melt, orally disintegrating tablets, and orodispersible systems, have the unique property of disintegrating the tablet in the mouth in seconds.

Orodispersable tablets (ODTs), being best alternative of conventional tablets, defined as a solid dosage form containing medicinal substance that disintegrates within a matter of seconds when placed upon tongue (Hanawa et al, 1995). Two different type of dispersible tablets distinguished as one that disintegrates/dissolves instantaneously in the mouth and to be swallowed without the needs for drinking water (Bi Y Sunada et al, 1996), while the other tablet formulation can be readily to be dispersed in water to form a dispersion (Brown D et al, 2003) which is easy to ingest by the patients (Sandri G et al, 2006). The ODTs formulations have interesting features like exceptional taste masking ability (Fu Y Yang, et al 2004), extremely low disintegration time, and pleasant mouth feel (Orjales Venero, et al, 1993). bioavailability (Martin T.P et al , 1993) and as result of reduced dosage, improved the clinical performance through a reduction of unwanted effects (Pandya, H et al,1998).

MATERIALS AND METHODS:

Procurement of drug and excipients:

The drug, excipients, chemicals/ reagents and equipments used for various experiments are enlisted as follows: Terbutaline sulphate was gifted by ZCL chemicals Ltd. Mumbai, Maharashtra, India. Croscarmellose Sodium and Crospovidone were purchased from Yarrow chemicals Mumbai, Maharashtra and are of AR grade.

Preformulation Studies:

Determination of Melting Point of Terbutaline Sulfate:

Filled the appropriate amount of drug (Terbutaline Sulfate) in the three capillary and placed the filled capillary in the Digital melting point apparatus. Observed the melting point of the drug when it just start melting and when drug completely melted.

Determination of the Solubility of Terbutaline Sulfate:

Excess of drug was taken and added into different solvents (such as water, 0.1 N HCl, 0.1 N NaOH, ethanol, acetone, methanol etc) and shaken the solvents for 72 hrs and solution were filtered using whattman filter paper and checked the solubility of the drug in different solvent.

Development of Analytical Method for Estimation of Terbutaline Sulfate:

Scanning of Terbutaline Sulfate:

Determination of maximum wavelength (λmax) of terbutaline sulfate was done by preparing three different dilutions of stock solutions (1mg/mL) and scanned those dilutions under UV-Vis Spectrophotometer.

Preparation of Calibration Curve of Terbutaline Sulfate in Phosphate Buffer Saline (PH – 7.4):

Dissolved 50 mg of terbutaline sulfate in 50 mL of Phosphate Buffer Saline, PH-7.4(stock solution). The stock solution of terbutaline sulfate is diluted with Phosphate Buffer Saline(PBS), PH-7.4 to make solution of 10, 20, 40, 60, 80 and 100 µg/mL. The prepared solutions were then examined under UV-Vis Spectrophotometer at λmax of 276 nm for absorbance and then calibration curve is plotted between absorbance and concentration (Dobetti, L et al., 2000).

Preparation of Co-processed Superdisintegrants:

The co-processed superdisintegrants were prepared by solvent evaporation method. A blend of crospovidone and croscarmellose sodium (in the ratio of 1:1, 1:2 & 1:3) was added to 10 ml of ethanol. The contents of the beaker (250 ml capacity) were mixed thoroughly and stirring was continued till most of ethanol evaporated. The wet coherent mass was granulated through # 44-mesh sieve. The wet granules were dried in a hot air oven at 60º C for 20 minutes. The dried granules were

sifted through # 44-mesh sieve and stored in airtight container till further use.(Fu, Y et al,2004)

Precompression Studies:
Various formulations and process variables were involved in mixing of ingredients and all these can affect the properties of the blends produced. Various evaluation parameters of blends tested are given below and data is represented in table.

Bulk density:
Method:
The sample under test was screened through sieve no.20, the sample equivalent to 25 gm (50 cm3) was accurately weighed and filled in a 100 ml graduated cylinder, the powder was leveled and the unsettled volume, Vo was noted. The bulk density was calculated in g/cm3 by the formula,
Bulk density = M/Vo
Where, M = mass of powder taken, and Vo = apparent unstirred volume

Tapped Density:
Method:
The sample under test was screened through sieve no.20 and the weight of sample equivalent to 25 g was filled in 100 ml graduated cylinder. The mechanical tapping of the cylinder was carried out using tapped density tester at a nominal rate of 300 drops per minute for 500 times initially and the tapped volume Vo was noted. Tapping was proceeding further for an additional tapping 750 times and tapped volume Vb was noted. The difference between two tapping volume was less than 2%, so Vb was considered as a tapped volume Vf. The tapped density was calculated in g/ cm3 by the formula,
Tapped density = M/Vf
Where, M = weight of sample taken, and Vf = tapped volume

Compressibility Index:
The bulk density and tapped density was measured and compressibility index was calculated using the formula. Grading of the powders for their flow properties according to carr's index is given in table No.

$$\text{Compressibility Index} = \frac{\text{Tapped density} - \text{Bulk density}}{\text{Tapped density}} \times 100$$

Hausner ratio:
Method:
Tapped density and bulk density were measured and the Hausner ratio was calculated using the formula,

$$\text{Hausner ratio} = \frac{\text{Tapped density}}{\text{Bulk density}}$$

If the value for Hausner ratio < 1.24 than it shows good flow properties.

Angle of repose:
Angle of repose indicates the frictional forces in a loose powder. It can be defined as the maximum angle between the slope of pile of powder and its base. The Angle of repose was determined using funnel method, designed by Newmann. The blend was poured through a funnel that could be raised vertically until a specified cone height (h) was obtained. Radius of the heap (r) was measured and angle of repose (θ) was calculated using the formula

$$\tan \theta = h / r$$

$$\text{Therefore } \theta = \tan^{-1} h / r$$

Where
θ = angle of repose
H = height of cone
R = radius of cone

Preparation of fast dissolving tablets by direct compression method:
Fast dissolving tablets of Terbutaline Sulphate were prepared by direct compression. All the ingredients (except granular directly compressible excipients) were passed through # 60-mesh separately. Then the ingredients were weighed and mixed in geometrical order. Powder blend was evaluated for bulk density, tapped density, Carr's index and Hauser's ratio.Compressed into tablets of 150mg using 8mm round flat punches on 10-station rotary tablet machine (Clit).(Gohel MC et al,2007)

Table: 1: Formula for different batches of Terbutaline Sulphate tablets

Ingredients	CF F1	PM F2	PM F3	PM F4	CP F5	CP F6	CP F7
Terbutaline Sulphate	5	5	5	5	5	5	5
Mannitol	110	101	101	101	101	101	101
Superdisintegrants (CP+CCS)	-	10	10	10	10	10	10
Aerosil	30	30	30	30	30	30	30
Pre-gelatinised Starch	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Menthol	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Magnesium stearate	1.0	1.0	1.0	1.0	1.0	1.0	1.0

Where, **PM(F2,F3,F4) -** Physical Mixture of crospovidone and croscarmellose sodium in different Ratios (1:1, 1:2, 1:3), **CP(F5,F6,F7)-** Co-processed Superdisintegrants of crospovidone and croscarmellose sodium in different Ratios (1:1,1:2, 1:3), **CF,F1-** Control formulation (without superdisintegrants), **CP –** Crospovidone, **CCS–** Croscarmellose sodium

Evaluation of Formulated fast dissolving Tablet:
Hardness:. Hardness is amount of strength of tablet to withstand mechanical shocks of handling in manufacture, packaging and shipping and tablet should be able to withstand reasonable abuse when in the hand of consumer . Hardness of tablet was evaluated by Monsanto hardness tester or Pfizer tester. Hardness was measured in kg/cm2 and for tablet it is above 4-6 kg/cm2.

Friability:
This test is applicable to compressed tablets and is intended to determine the physical strength of tablets. It was evaluated by Roche Friabilator with 100 revolution rotating 25 per minute for 4 min by using 6 tablets. According to USP tablet should have limit < 1%. for acceptance
Following formula was used to calculate the friability.

%F=1- (loss in weight/initial weight)100

Weight variation:
Weight variation was calculated as per method describe in USP.20 tablets was weighed individually and the average wias calculated.The requirements are met if the weight of not more then 2 of tablets differ by more then percentage listed in the tablet and no tablets differ by in weight by more then double that percentage.

Table No. 2. Percentage weight variation of tablet (I.P)

S. No	Average weight of individual tablet	Limits (%)
1	≤ 130	10
2	130-324	7.5
3	≥ 324	5

Wetting Time and Water Absorption Ratio (R):
Twice folded tissue paper was placed in a Petri dish having an internal diameter of 5 cm containing 6 ml of water. A tablet was carefully placed on the surface of the tissue paper in the Petri dish. The time required for water to reach the upper surface of the tablet and to completely wet it was noted as the wetting time. Water absorption ratio (R) was then determined according to the following equation:

$$R = 100 \times (wa - wb)/ wb$$

Where wb and wa were tablet weights before and after water absorption, respectively.

Disintegration test:
Disintegration test was measured using disintegration test apparatus. One tablet was placed in each of the six tubes of disintegration test apparatus. I.P. method was followed without using disc. The time required for complete disintegration of tablet in each tube was determined using stop watch.

Content of Active Ingredients:
Prepared tablets were accurately weighed and finely powdered by pestle in a mortar. A weighed portion of each powder equivalent to dose (250mg) of the prepared tablet was transferred in to a volumetric flask and the drug was dissolved in the solvent. The contents of the flask were sonicated for 10 min and diluted with 0.1 N HCl as the solvent. The samples were analyzed spectrophotometrically at 276 nm.

Thickness variation:
Ten tablets from each formulation were taken randomly and their thickness was measured with a micrometer screw gauge.

In-vitro Dissolution studies of tablet using dissolution apparatus:
In vitro dissolution studies of the promising fast dissolving tablets of Terbutaline Sulphate, control and commercial conventional tablet formulations were performed according to USP XXIII Type-II dissolution apparatus (Electrolab, model TDT-06N) employing a paddle stirrer at 50 rpm using 900 ml of pH 6.8 phosphate buffer at 37±0.5ºC as dissolution medium. One tablet was used in each test. Aliquots of the dissolution medium (5 ml) were withdrawn at specific time intervals (2, 4, 6, 8, 10, 15&30 min) and replaced immediately with equal volume of fresh medium. The samples were filtered through 0.22 mm membrane filter disc and analyzed for drug content by measuring the absorbance at 276 nm. Drug concentration was calculated from the standard calibration curve and expressed as cumulative percent drug dissolved. The release studies were performed in replicates of three.

RESULT AND DISCUSSION:

Preformulation Studies:

Determination of Melting Point of Terbutaline Sulfate:
The melting point of Terbutaline sulfate was determined to check the purity of the Terbutaline sulfate. The melting point of the Tebutaline sulfate was determined using Digital melting point apparatus. The results of the observed melting point of Terbutaline Sulfate are shown in the Table 8.1.

Table 1 : Data of Melting Point Determination of Terbutaline Sulfate

Sr. No.	Capillary Number	Observed Melting point (° C)
1	Capillary A	248
2	Capillary B	248
3	Capillary C	249

The results of the melting point determination showed that the drug is pure because it has melting point(248 ° C) nearer to the reported melting point (i.e. 246-248 ° C)

Determination of the Solubility of Terbutaline Sulfate:

The solubility of the Terbutaline Sulfate was determined to find the extent to which Terbutaline Sulfate was soluble in different solvents such water, 0.1 N HCl, 0.1 N NaOH, Methanol, Ethanol and Acetone. The solubility of drug in different solvent assist in identifying the proper release medium for in-vitro release studies. The results for the determination of the solubility of Terbutaline Sulfate are shown in the Table 8.2. The solubility of the terbutaline sulfate found to be maximum in water. The solubility of terbutaline sulfate in 0.1 N HCl and 0.1 N NaOH were found to be less than water. The solubility of terbutaline sulfate in acetone was found to be more than methanol but less than 0.1 N HCl. The solubility of terbutaline sulfate found to be poorly soluble in methanol and ethanol.

Table 2: Data of Solubility Determination of Terbutaline Sulfate

Sr. No.	Name of solvents	Solubility at 25° C (mg/mL)
1	Water	30 ± 0.45
2	0.1 N HCl	26 ± 0.63
3	0.1 N NaOH	28 ± 0.87
4	Methanol	2.7 ± 0.52
5	Ethanol	1.2 ± 0.74
6	Acetone	10 ± 0.69

Development of Analytical Method for Estimation of Terbutaline Sulfate:

Scanning of Terbutaline Sulfate:

The scanning of Terbutaline Sulfate was performed to determine the wavelength at which Terbutaline Sulfate absorb maximum of UV radiation when the solution of Terbutaline Sulfate was exposed to UV radiation. The Scanning of Terbutaine Sulfate was done by placing solutions of different dilutions (100, 10, 1 µg / mL) of stock solution (1 mg/mL) in Phosphate Bufer Saline pH-7.4 under UV Spectrophotometer. The results of scanning of Terbutaline Sulfate are shown in the Table 8.3.

Table 3 : Dilution data of stock solution for scanning of Terbutaline Sulfate in Phosphate Buffer Saline (pH-7.4)

Sr. No.	Dilution of stock Solution of Terbutaline Sulfate (1 mg/mL) with PBS (pH-7.4)	Concentration (µg / mL)	Maximum Wavelength (λmax) (nm)	Absorbance
1	10 times (1in 10 mL)	100	276.0	0.794
2	100 times(1 in 100 mL)	10	276.5	0.099
3	1000 times(1 in 1000 mL)	1	281	0.016

The results of scanning of terbutaline sulfate at 100, 10, 1 µg / mL showed that the solution of the 100 µg / mL has maximum absorbance at wavelength of 276 nm. This wavelength is selected as λmax for the determination of absorbance of different concentration of solutions.

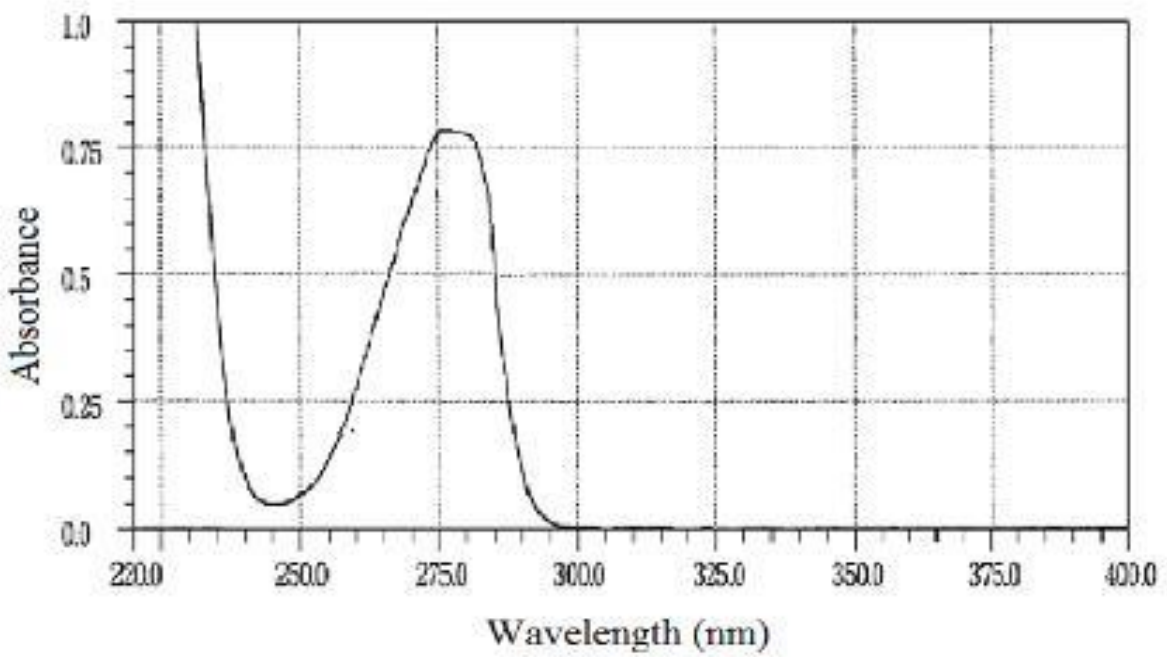

Figure 1: Scanning of Terbutaline Sulfate in Phosphate Buffer Saline pH – 7.4

Preparation of Calibration Curve of Terbutaline Sulfate by U.V Spectroscopy Method:

The calibration curve of Terbutaline Sulfate in Phosphate Buffer Saline (PBS) pH-7.4 was prepared to identify the linearity range of Terbutaline Sulfate. The calibration curve of Trebutaline Sulfate was prepared by examining the absorbance of Terbutaline Sulfate solutions of 10, 20, 40, 60, 80 and 100 µg / mL in Phosphate Bufer Saline pH-7.4 under UV Spectrophotometer at λmax of 276 nm. The results of absorbance of Terbutaline Sulfate solutions are shown in the Table 8.

Table 4 : Data for preparation of Calibration Curve of Terbutaline Sulfate in Phospahte Buffer Saline (pH 7.4) at λmax of 276 nm

Sr. No.	Concentration of Terbutaline Sulfate (µg / mL	Absorbance ± SD (n=3)
1	10	0.077±0.06
2	20	0.156±0.07
3	40	0.317±0.05
4	60	0.466±0.09
5	80	0.632±0.07
6	100	0.796±0.08

All values are average of three determinations (n=3)

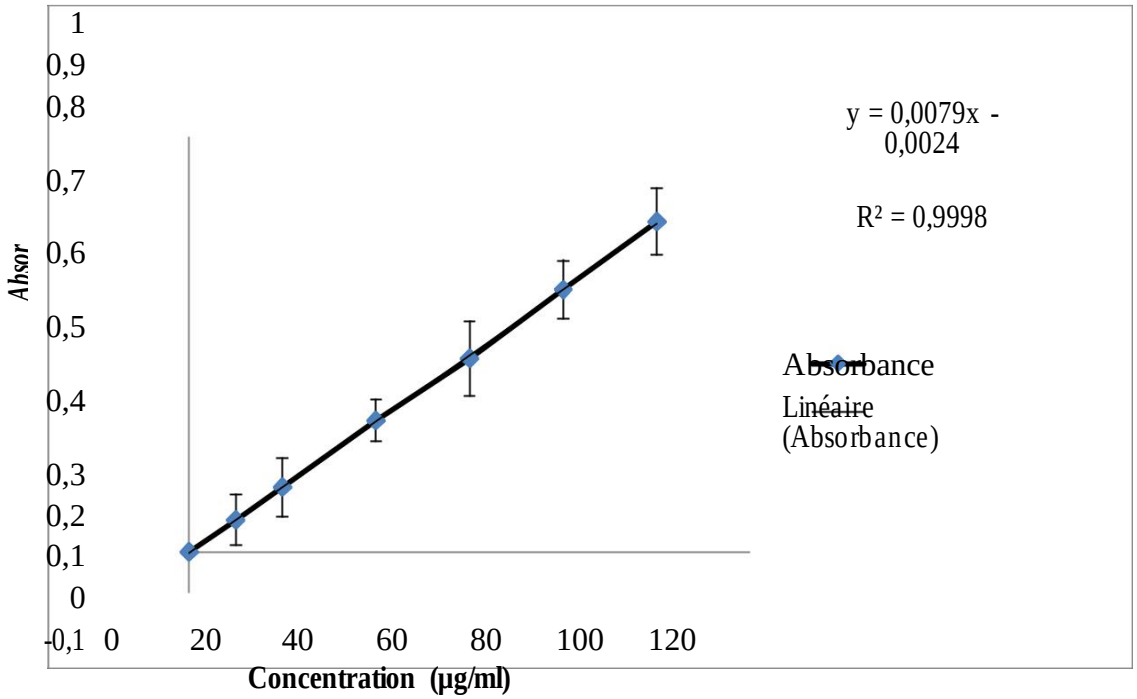

Figure 2: Calibration Curve of Terbutaline Sulfate in Phosphate Buffer Saline (pH-7.4) at λmax of 276 nm

The results of calibration curve of terbutaline sulfate in Phosphate Buffer Saline (PH – 7.4) showed that curve is straight line with r^2 =0.9998 (as shown in Figure 8.2)

In- vitro drug release study:

In-vitro drug release of Pure drug (Terbutaline sulfate):

The result of in-vitro drug release of Pure drug (Terbutaline Sulfate) shown in Table 8.11
And the graph of in-vitro release of Pure drug shown in Figure 8.3.

Table 5 : In-Vitro Drug Release of pure drug (Terbutaline Sulfate) in Phosphate Buffer Saline pH-7.4

S. No.	Time (Mins)	Cumulative % drug release ± SD(n=3)
1	0	0
2	5	64.08 ± 4.35
3	10	99.68 ± 3.72
4	15	100.21± 2.65

All values are average of three determinations (n=3)

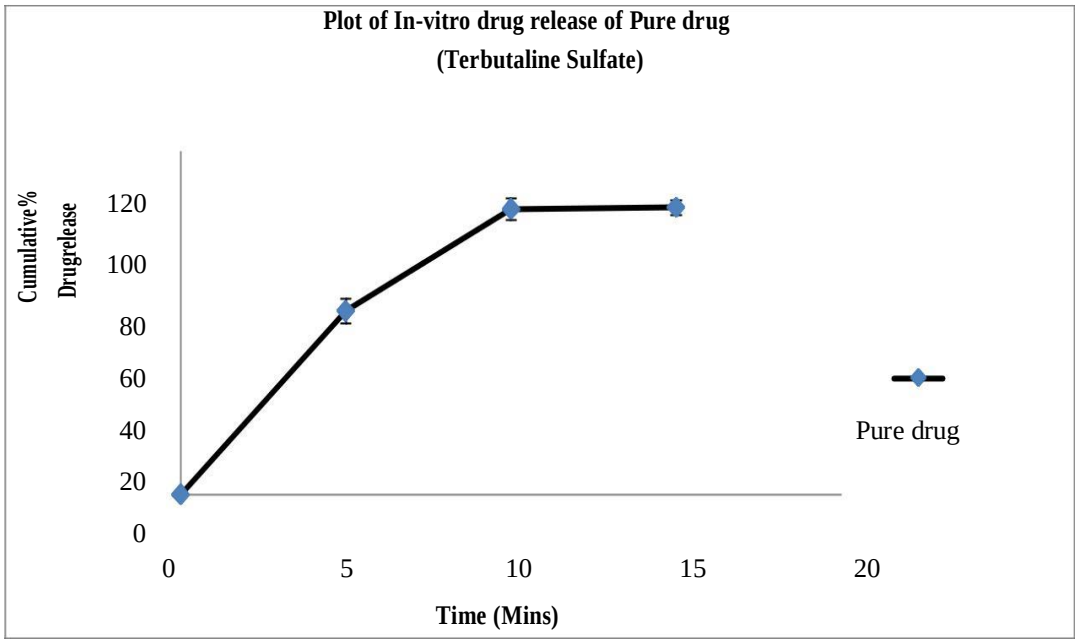

Figure 3: Plot of In-Vitro Drug Release of Pure Drug (Terbutaline Sulfate)

Precompression Studies:

Co-processed superdisintegrants were prepared by solvent evaporation using crospovidone and croscarmellose sodium in different ratios (1:1, 1:2. & 1:3). The co-processed superdisintegrants were evaluated for their flow and compression properties in comparison with physical mixture of superdisintegrants. The angle of repose of co-processed superdisintegrants was found to be <25º which indicate excellent flow in comparison to physical mixture of superdisintegrants (>30º) due to granule formation, Carr's index in the range of 10-15% and Hausner's ratio in the range of 1.10-1.14 (Table 8.5).

TABLE 6: Pre-compression Parameters of Co-processed Superdisintegrants and Physical Mixture of Superdisintegrants

Parameters	Formulation Code					
	PM1	PM2	PM3	CP1	CP2	CP3
Bulk density (g/cc)	0.38	0.37	0.42	0.23	0.25	0.28
Tapped density (g/cc)	0.47	0.43	0.49	0.26	0.27	0.30
Angle of repose (degree)	32	30	36	24	26	24
Carr's index (percent)	14	16	14	12	13	11
Hausner's Ratio	1.15	1.15	1.16	1.14	1.12	1.10

TABLE 7: Pre-compression Parameters of Terbutaline Sulphate FDT Formulations Prepared by Direct Compression Method

Parameters	Formulation Code						
	CPF1	PMF2	PMF3	PMF4	CPF5	CPF6	CPF7
Bulk density (g/cc)	0.56	0.54	0.53	0.54	0.51	0.53	0.52
Tapped density (g/cc)	0.61	0.60	0.63	0.63	0.57	0.58	0.59
Angle of repose (degree)	31.27	29.21	30.3	29.35	28.83	28.62	28.97
Carr's index (percent)	17	14	13	13	12.3	11.58	12.8
Hausner's Ratio	1.08	1.15	1.14	1.13	1.13	1.12	1.14

Evaluation of Formulated fast dissolving Tablet:
Fast dissolving tablets of Terbutaline Sulphate were prepared using co-processed superdisintegrants and physical mixture of superdisintegrants. Directly compressible mannitol (Pearlitol SD 200) was used as a diluent to enhance mouth feel. A total of six formulations and control formulation CP_0 (without superdisintegrant) were designed. As the blends were free flowing (angle of repose $<30^0$ and Carr's index <15% Table 3), tablets obtained were of uniform weight (due to uniform die fill), with acceptable variation as per IP specification i.e., below 7.5%. Drug content was found to be in the range of 99 to 101%, which is within acceptable limits. Hardness of the tablets was found to be in the range of 2.96-3.13 kg/cm^2. Friability below 1% was an indication of good mechanical resistance of the tablets. Water absorption ratio and wetting time, which are important criteria for understanding the capacity of disintegrants to swell in presence of little amount of water were found to be in the range of 44-85% and 30-106 sec respectively. Among all the designed formulations, formulation, CPF5 was found to be promising and displayed an *in vitro* dispersion time of 22 sec, which facilitates their faster dispersion in the mouth.

Overall, the formulation CPF5 containing 4% w/w of co-processed superdisintegrants (1:1 mixture of crospovidone and croscarmellose sodium) was found to be promising and has shown an *in vitro* dispersion time of 22 sec, wetting time of 30 sec and water absorption ratio of 86% when compared to the formulation PMF2 containing 4% w/w of Physical mixture of superdisintegrant (1:1 mixture of crospovidone and croscarmellose sodium) which shows 36sec, 38 sec, 76% and control formulation (CPF1) which shows 99 sec, 106 sec and 46% values respectively for the above parameters (Table 8.7).

***In-vitro* Dissolution studies of tablet using dissolution apparatus:**
In vitro dissolution studies on the promising formulation CPF5, control (CPF1) and commercial conventional formulations (CCF) were carried out in pH 6.8 phosphate buffer, and the various dissolution parameter values viz., percent drug dissolved in 5 min, 10 min and 15 min (D_5, D_{10} and D_{15}), dissolution efficiency at 10 min (DE_{10} min), $t_{50\%}$, $t_{70\%}$ and $t_{90\%}$ are shown in Table 8.8 and dissolution profile depicted in fig. 8.4.. This data reveals that overall, the formulation CPF5 has shown nearly two-and-a-half-fold faster drug release ($t_{50\%}$ 2.41 min) when compared to the commercial conventional tablet formulation of Terbutaline Sulphate ($t_{50\%}$ 6 min).

TABLE 8: Evaluation of Terbutaline Sulphate FDT Formulations

Parameters	Formulation Code						
	CP_0	**PMF2**	**PM F3**	**PM F4**	**CP F5**	**CP F6**	**CP F7**
Hardness (kg/cm^2)* ±SD	2.96±0.05	2.9±0.1	2.83±1.4	3.26±0.05	3.13±0.04	3.23±0.05	3.25±0.03
Thickness* (mm)	2.23±0.02	2.17±0.02	2.26±0.05	3.0±0.01	2.11±0.02	2.21±0.01	2.12±0.01
In vitro Dispersion time (s)* ±SD	98±2	36.31±1.52	41.13±0.77	41.36±2.52	22±2	31.33±3.41	39±2.0
Wetting time (s)* ±SDs	106±4.93	39.66±1.52	42±1	45.33±1.5	31±0.5	34.33±1.52	41.56±1.15
Water Absorption ratio (%)* ±SD	46±1	76.33±1.15	71.66±1.52	64±1	86±1	78±2.08	71±2.14
Percent Drug Content (%)* ±SD	99.21±1.52	99.28±1.01	100±1.57	100±2.02	99.97±0.07	101±1.19	98.45±2
Weight Variation(%)	146-159 mg (IP limits ± 7.5%)						

TABLE 9: *IN Vitro* Dissolution Parameters in pH 6.8 Phosphate Buffer

Formulation code	**Parameters**						
	D_5	**D10**	**D15**	**t50%**	**t70%**	**t90%**	**DE10min**
CPF 1	26 %	53.43%	62.81%	9.30 min	12.50 min	>30 min	27.02%
CCF	40%	72%	81.77%	6 min	9.5 min	29 min	39.0%
PMF2	70%	80.86%	87.46%	3.88 min	5 min	16 min	61.39%
CPF5	76.5%	90.63%	99.27%	2.41 min	3.48 min	9.48 min	64.80%

Where, CPF1 is control formulation, CPF5 is promising fast dissolving tablet formulation, PMF2 is formulation containing physical mixture of superdisintegrants in 1:1 ratio, CCF is conventional commercial tablet formulation, D_5 is percent drug released in 5 min, D_{10} is percent drug release in 10 min, D_{15} is percent drug release in 15 min, DE_{10min} is dissolution efficiency at 10 min, $t_{50\%}$ is time for 50% drug dissolution, $t_{70\%}$ is time for 70% drug dissolution, $t_{90\%}$ is time for 90% drug dissolution

Dissolution Studies:

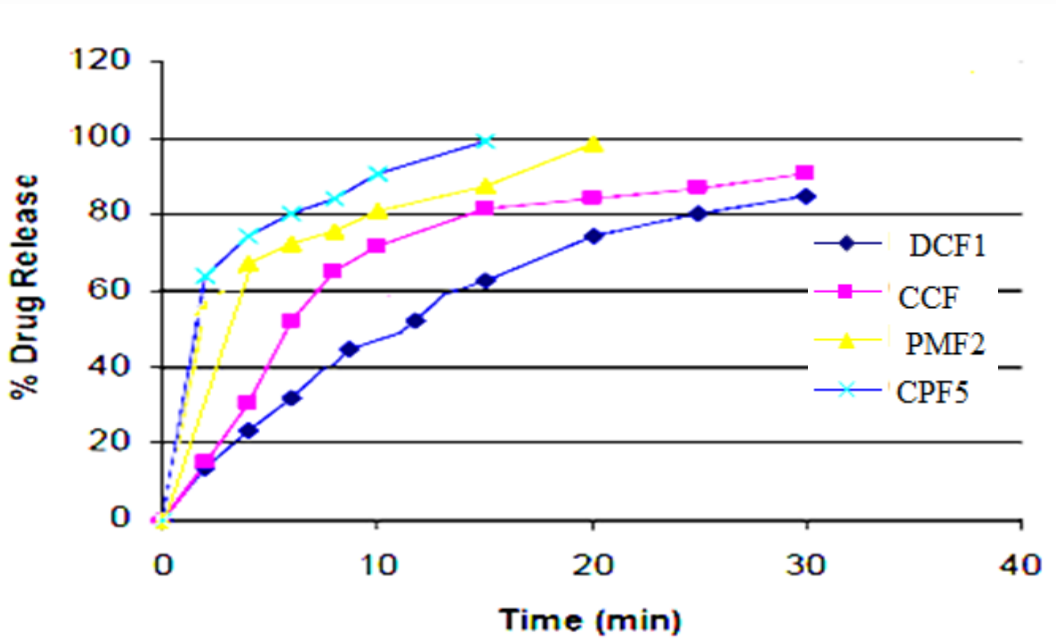

FIGURE 4: Dissolution rate profiles of (–♦–) control formulation (–■–) conventional commercial formulation (–▲–) formulation containing 1:1 physical mixture of crospovidone and croscarmellose sodium (--×--) **promising formulation in pH 6.8 phosphate buffer**

CONCLUSION:

Summary In the present research work an attempt has been made to optimize, formulate and characterize fast dissolving tablet (s) of Terbutaline Sulphate. Co-processed superdisitegrants consisting of crospovidone and croscarmellose sodium exhibited good flow and compression characteristics.

Terbutaline sulphate tablets containing co-processed superdisintegrants exhibited quick disintegration and improved drug dissolution. This formulation is more cost effective than aerosol inhalation pumps available. It was found that the total maximum amount of drug from the optimised batch was released in first 4 minutes of the dissolution study. The tablets disintegrated within 50 sec under experimental in vitro laboratory conditions. It can be concluded from the present work that co-processed superdisintegrants of crospovidone and croscarmellose are superior to physical mixture of crospovidone and croscarmellose used in Terbutaline sulphate fast dissolving tablets.

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