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Preparation and characterization of hydralazine mouth dissolving tablet by using super-disintegrates

Dhone P.G
Professor & Head, Department of Pharmacology, RSDKS GMC, Ambikapur

Mehta Jitendra
Assistant professor, Department of Pharmacology, RSDKS GMC, Ambikapur

Singh Watsala
Demonstrator, Department of Pharmacology, RSDKS GMC, Ambikapur

Shende Tanaji*
Associate professor, Department of Pharmacology NKPSIMS NAGPUR
***Corresponding author:**

Lalan Manisha S
Associate Professor, Sat kaival College of Pharmacy, Sasra Gujrat India

***Abstract*---**Tablet dosage form is the most popular among all existing conventional dosage forms because of its convenience of self-administration, compactness and easy manufacturing. Many patients find it difficult to swallow tablets and capsules. The difficulty is experienced in particular by pediatric and geriatric patients, but it also applies to people who are ill on bed and to those active working patients who are busy or traveling, especially those who have no access to water. Mouth dissolving tablet was prepared by addition of superdisintegrants (Ac-Di-Sol, Sodium starch glycolate and Crospovidone). The tablets were evaluated for their organoleptic (Color, Odor, Taste), physical (Size, Shape and Texture) and quality control parameters (Diameter, Thickness, Hardness, Friability, Disintegration Time and Wetting Time). Hence, mouth dissolving tablets of resinate can be successfully prepared by superdisintegrants, maintaining their disintegration time less than 1 minute, which provide faster effect and better patient compliance. These tablets may be helpful for geriatric and pediatric patients experience difficulty in swallowing conventional tablets, which leads to poor patient compliance. Thus, it was concluded that the method designed for drug resinate complexation and tablet formulation is simple, rapid, cost effective and highly efficient.

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***Keywords*---**Resinate, Crospovidone, Hydralazine, Mouth Dissolving Tablets, Superdisintegrants.

1. Introduction

Mouth Dissolving Tablets

Tablet dosage form is the most popular among all existing conventional dosage forms because of its convenience of self-administration, compactness and easy manufacturing. Many patients find it difficult to swallow tablets and capsules.[1,2] The difficulty is experienced in particular by pediatric and geriatric patients, but it also applies to people who are ill on bed and to those active working patients who are busy or traveling, especially those who have no access to water.[3]

Need to Formulate Mouth Dissolving Tablets

1. The need for non-invasive drug delivery systems continues due to patient's poor acceptance and compliance with existing delivery regimes, limited market size for drug companies and drug uses coupled with high cost of disease management. MDT is one such dosage form which is useful for: [4]
2. Geriatric patients mainly suffering from conditions like hand tremors and dysphasia.[5]
3. Pediatric patients who are unable to swallow easily because their central nervous system and internal muscles are not developed completely.[6]
4. Traveling patients suffering from motion sickness and diarrhea that do not have easy access to water[7]

2. Materials and Methods

The drug hydralazine HCl were used. the amount of drug was 35 mg. the different super disintegrates was used to make a suitable mouth dissolving tablet. All the other reagents which is used in analytical grade reagents. Mouth dissolving tablet was prepared by addition of superdisintegrants (Ac-Di-Sol, Sodium starch glycolate and Crospovidone). The tablets were evaluated for their organoleptic (Color, Odor, Taste), physical (Size, Shape and Texture) and quality control parameters (Diameter, Thickness, Hardness, Friability, Disintegration Time and Wetting Time).

Formulation of Hydralazine HCl Mouth Dissolving Tablet preparation by Using Superdisintegrants

Table no. 1: Formulation of Mouth Dissolving Tablets with Resinate

Ingredients	FDT1	FDT2	FDT3	FDT4	FDT5	FDT6
Drug resinates equivalent to 5 mg of hydralazine HCl	35 mg	35 mg	35 mg	35 mg	35 mg	35 mg
Crospovidone	3 mg	4 mg	-	-	-	-
Ac-Di-Sol	-	-	3 mg	4 mg	-	-
SSG	-	-	-	-	3 mg	4 mg
MCC	26	26	26	26	26	26
Dextrose	15	15	15	15	15	15
Lactopress	15	15	15	15	15	15
Talc	2	2	2	2	2	2
Magnesium Stearate	2	2	2	2	2	2

3. Results

3.1 Evaluation of Tablet Blend

Table no. 2: Evaluation of Tablet Blend

Ingredients	FDT1	FDT2	FDT3	FDT4	FDT5	FDT6
Bulk Density (gm/cm^3)	0.584± 0.009	0.625± 0.007	0.611± 0.006	0.627± 0.006	0.633± 0.005	0.574± 0.012
Tapped Density (gm/cm^3)	0.666± 0.007	0.718± 0.008	0.711± 0.010	0.714± 0.011	0.715± 0.011	0.649± 0.003
Compressibilty Index (%)	12.212± 0.005	12.952± 0.005	14.051± 0.010	12.220± 0.004	11.447± 0.015	11.499± 0.004
Hausners Ratio	1.126± 0.392	1.134± 0.544	1.136± 0.765	1.112± 0.795	1.129± 1.233	1.117± 0.782
Angle of Repose	22.713± 0.953	22.931± 0.268	23.189± 0.553	23.756± 0.434	23.282± 0.754	24.231± 0.725

3.2 Characterization of Mouth Dissolving Tablets

Table no. 3: Characterization of Mouth Dissolving Tablets

	FDT1	FDT2	FDT3	FDT4	FDT5	FDT6
Thickness(mm)	2.313± 0.022	2.076± 0.121	2.329± 0.089	2.415± 0.025	2.361± 0.061	2.295± 0.066
Weight (mg)	99.133± 0.665	98.466± 0.737	99.4± 0.264	100.833± 1.450	97.233± 0.602	97.733± 0.321
Hardness (kg/cm^3)	2.713± 0.156	2.913± 0.200	3.043± 0.150	3.003± 0.090	2.800± 0.191	2.990± 0.101
Friability (%)	0.823± 0.051	0.64± 0.05	0.536± 0.030	0.626± 0.045	0.653± 0.081	0.856± 0.041
in-vitro Disintegration	51.66±	20.66±	62.66±	38.00±	66.33±	41.66±

time (s)	2.51	2.08	2.516	3.00	3.05	1.52
Wetting time (s)	47.33± 6.02	18.66± 2.51	57.66± 3.51	32.33± 3.51	55.66± 6.11	38.33± 2.08
in vitro Dispersion Time (s)	57.33± 1.52	26.33± 2.08	63.63± 2.08	31.33± 2.51	68.66± 2.08	46.00± 2.64

3.3 Content Uniformity

Table no. 4: Drugs Content in the Mouth Dissolving Tablet of Hydralazine HCl by using superdisintegrants

Formulations Code	Parameters	
	Drug Content (mg per Tablet)	Drug Content (%)
FDT1	4.86±0.25	97.2
FDT2	4.93±0.35	98.7
FDT3	4.83±0.30	96.7
FDT4	4.96±0.42	99.2
FDT5	4.94±0.25	98.8
FDT6	4.97±0.31	99.4

3.4 in-vitro Dissolution Studies

Table no. 5: *in-vitro* Release Data of Hydralazine HCl Tablet by using superdisintegrants

Time (min.)	Cumulative Percent Drug Released					
	FDT1	FDT2	FDT3	FDT4	FDT5	FDT6
0.000	0.000	0.000	0.000	0.00	0.000	0.000
1.000	74.27	77.58	68.75	70.96	57.72	61.03
2.000	77.99	84.63	70.33	74.22	64.66	67.99
3.000	85.04	89.51	72.98	76.89	69.43	73.88
4.000	92.13	95.52	80.73	85.66	73.12	78.70
5.000	94.84	98.25	81.67	90.54	75.72	80.23

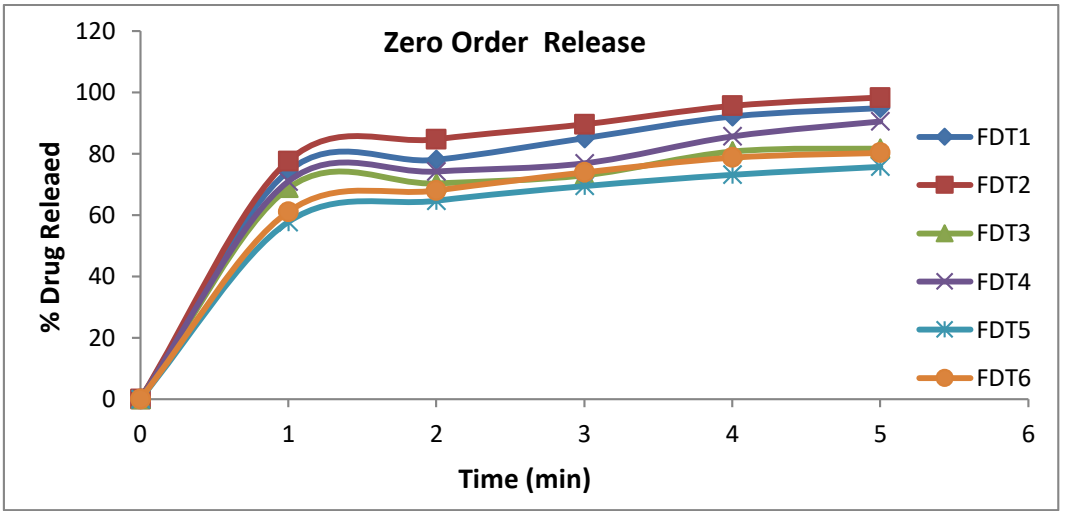

Figure 1: *in-vitro* Release curve of Hydralazine HCl Tablet-Zero Order Release

3.5 Log % Drug Retained Data of Hydralazine HCl Tablet

Table no. 6: *in-vitro* Log % Drug Retained Data of Hydralazine HCl Tablet by using superdisintegrants

Time (min.)	Log Cumulative Percent Drug Retained					
	FDT1	FDT2	FDT3	FDT4	FDT5	FDT6
0	2	2	2	2	2	2
1	1.410	1.350	1.494	1.462	1.626	1.590
2	1.342	1.186	1.472	1.411	1.548	1.505
3	1.174	1.020	1.431	1.363	1.485	1.416
4	0.895	0.651	1.284	1.156	1.429	1.328
5	0.712	0.243	1.263	0.975	1.385	1.296

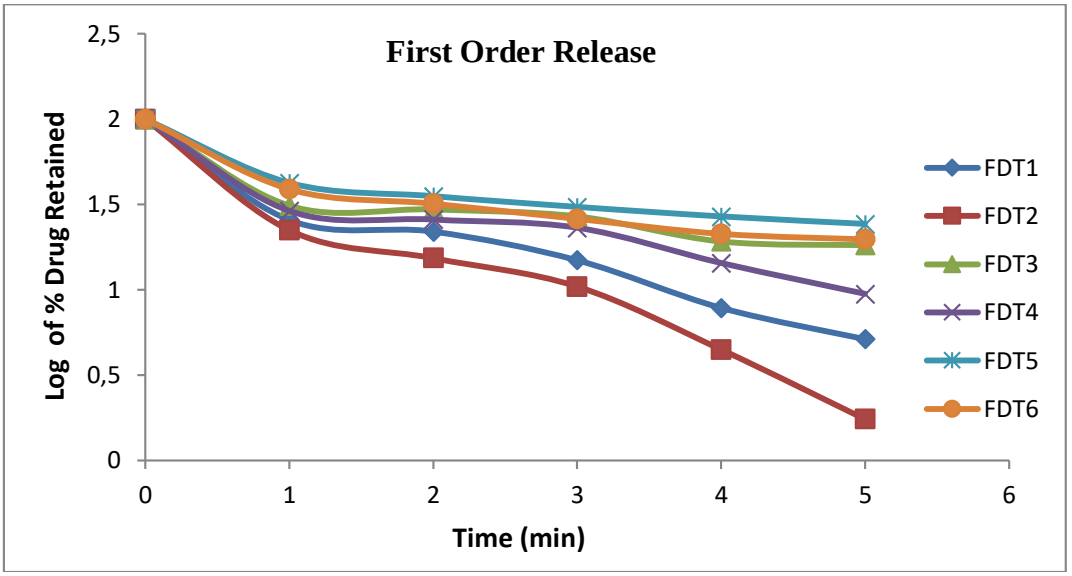

Figure no 2: *in-vitro* Drug Retained Curve of Hydralazine HCl Tablet-First Order Release

3.6 Comparison of Release with Marketed Tablets

Table no. 7: *in-vitro* Release Profile of Hydralazine HCl Marketed Tablets

Time (min)	Cumulative % Drug Release (Marketed)	Log Cumulative %Drug Retained (Marketed)
0	0	2
1	9.53	1.95
2	18.46	1.91
3	24.64	1.88
4	28.74	1.85
5	38.33	1.79
30	43.73	1.75
60	46.37	1.73

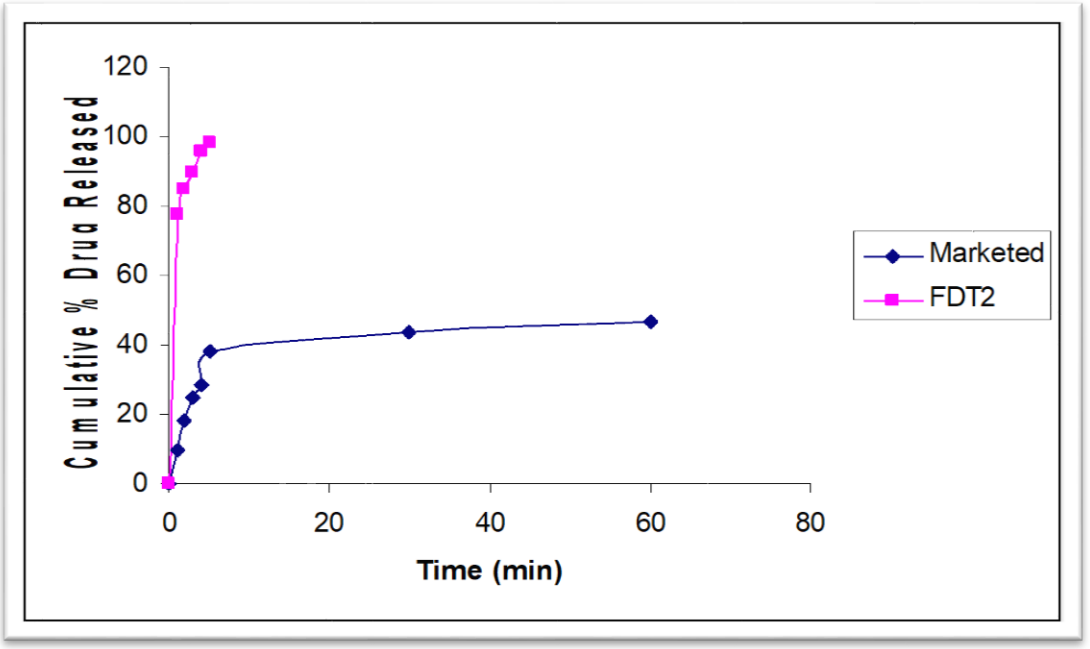

Figure no.3: *in-vitro* Zero Order Release Curve of FDT2 and Hydralazine HCl Marketed Tablets

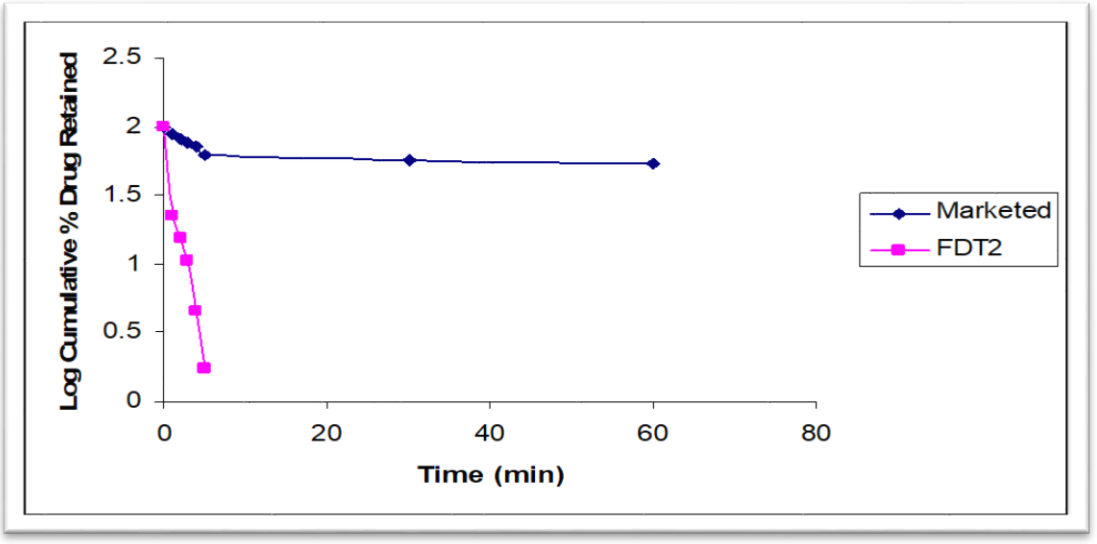

Figure no.4: *in-vitro* First Order Release Curve of FDT2 and hydralazine HCl Marketed Tablets

4. Conclusion

In the present study Mouth dissolving tablet was prepared by addition of superdisintegrants (Ac-Di-Sol, Sodium starch glycolate and Crospovidone). The tablets were evaluated for their organoleptic (Color, Odor, Taste), physical (Size,

Shape and Texture) and quality control parameters (Diameter, Thickness, Hardness, Friability, Disintegration Time and Wetting Time). The disintegration properties of tablet were observed as Crospovidone > Ac-Di-Sol > Sodium starch glycolate**.** On applying zero order and first order dissolution kinetic treatments, it was found that all the prepared tablets followed first order kinetics.
The drug release was found as

FDT2 >FDT1 >FDT4 >FDT3 >FDT6 >FDT5

The rapid drug dissolution might be due to the easy and fast breakdown of tablet and rapid absorption of drug into the dissolution media. Hence, mouth dissolving tablets of resinate can be successfully prepared by superdisintegrants, maintaining their disintegration time less than 1 minute, which provide faster effect and better patient compliance. These tablets may be helpful for geriatric and pediatric patients experience difficulty in swallowing conventional tablets, which leads to poor patient compliance. Thus it was concluded that the method designed for drug resinate complexation and tablet formulation is simple, rapid, cost effective and highly efficient.

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