*Available online at* www.scholarsresearchlibrary.com

Scholars Research Library

**Der Pharmacia Lettre, 2017, 9 [8]:1-13**
***[http://scholarsresearchlibrary.com/archive.html]***

Der Pharmacia Lettre
Scholars Research Library
**ISSN 0975-5071**
**USA CODEN: DPLEB4**

# Formulation and Evaluation of Hydralazine Hydrochloride Orodisperdible Tablets By Direct Compression Method in the Treatment of Eclampsia And Pre-Eclampsia

**Muthukumar S[1], Sundara Ganapathy R[2*]**

[1]*Research Scholar, Karpagam Academy of Higher Education, Karpagam University, Coimbatore, Tamil Nadu, India*

[2]*Dean, Faculty of Pharmacy, Karpagam Academy of Higher Education, Karpagam University, Coimbatore-21, Tamil Nadu, India*

[*]***Corresponding author:*** *Muthukumar S, Research Scholar, Karpagam Academy of Higher Education, Karpagam University, Coimbatore, Tamil Nadu, India. E-mail:pharmmuthu@gmail.com*

---

## ABSTRACT

***Introduction:*** *Orodispersible tablets had received ever-increasing demand during the last decade, and the field has become a rapidly growing area in the pharmaceutical industry as oral drug delivery remains the preferred route for administration of various drugs. The purpose of the present research work was to formulate the orodispersible tablets of Hydralazine hydrochloride a drug of choice for eclampsia and pre-eclampsia to provide a suitable patient convenience dosage form an enhance to the bioavailability and to provide quick onset of action.*

***Materials and methods:*** *Formulation of the orodispersible tablets of Hydralazine hydrochloride were prepared by using various super disintegrants like cross povidone, crosscarmellose sodium, sodium starch glycolate by direct compression method. The formulas were evaluated for compatibility and Pre-Compression studies. The formulations were evaluated for weight variation, thickness, hardness, friability, content uniformity, disintegration time, wetting time, and water absorption ratio and release profile. Optimized formula was subjected to stability studies*

***Results:*** *Among all the formulations, F9 showed effective percentage of drug release at 12 minutes indicating faster and maximum absorption at the site of administration and showed superior quality based on stability reports.*

**Keywords:** Orodispersible tablets, Eclampsia, Pre-eclampsia, Hydralazine hydrochloride, Direct compression.

## INTRODUCTION

Oral drug delivery is currently the benchmark in the pharmaceutical industry, where it is regarded as the safest, most convenient way an acceptable form of drug delivery having highest patient compliance. Among the oral delivery formulation, tablets are the most popular because of convince of self-administration, compactness and easy manufacturing.. Many patients express difficulty in swallowing and chewing of tablets, the hard gelatin capsules, resulting in noncompliance and ineffective therapy. This difficulty in swallowing is called dysphasia this problem has been encountered in all group of patients, but especially with pediatric, geriatric populations and also in pregnant women. This draw back has paved attention in developing fast dissolving drug delivery system. To overcome this weakness formulators have developed innovative drug delivery known as Orodispersible tablets. Orodispersible tablets are define as solid dosage form containing medicinal substances or active ingredient which disintegrate rapidly within few seconds, when placed upon the tongue providing rapid onset of action, increased bioavailability and good stability [1-6].

Direct compression for tablets manufacturing using conventional equipment and commonly available excipient with the limited number of processing steps is considered the easiest way for tablet preparation. Compressed tablets disintegration and solubilisation depends mainly on the presence of either single or combined action of disintegrants, water soluble excipient, and effervescent gents that hasten the process of disintegration.

Eclampsia and pre-eclampsia is one of the most dangerous clinical conditions for baby and mother leading to unpredictable onset progression, and incurable except by termination of pregnancy. The disorder is recognized by the concurrence of pregnancy induced changes that regress after delivery, of which hypertension and proteinuria are the easiest to recognize. The condition is treated by some category of antihypertensive and diuretics [7-13]. Among those Hydralazine Hydrochloride is one of the drug of choice. The present study aims at the development of orodispersible tablets of Hydralazine hydrochloride by direct compression method using super disintegrants.

## MATERIALS AND METHODS

Hydralazine hydrochloride was procured as a gift sample from Octopus pharmaceuticals, Chennai. Superdisintegrants like Croscarmellose sodium, Crospovidone, Sodium starch glycolate. Other excipients like Aspartame, Mannitol, Magnesium stearate, Micro crystalline cellulose, and Talc were purchased from Himedia Ltd, Goa and all other materials were of analytical grade.

### *Preparation of Orodispersible tablets by direct compression method*

Orodispersible tablets of Hydralazine hydrochloride were prepared by direct compression method using super disintegrants such as, crospovidone, croscarmellose sodium and sodium starch glycolate in varying ratios. All the materials were passed through the mesh number of 60 meshes prior to mixing for uniformity in particle size. The drug and microcrystalline cellulose were mixed using glass mortar of pestle in a small portion of both at each time which blended to get a uniform mixture and kept a side. Then the other ingredients were weighed and mixed in a geometrical order which the tablets were compressed using 8mm size punch to

get 200 mg weight using ten stations Rimek tablet punching machine. Compositions of different formulations of the tablets were given in Table 1.

***Compatibility studies***

**IR studies:** IR spectra for pure drug and powdered tablets were recorded in Infrared spectrophotometer with KBr pellets.

**DSC and TGA:** Differential scanning calorimeter and thermo gravimetric analysis which were performed for drug and formulated tablets.

***Evaluation of Orodispersible tablets of Hydralazine hydrochloride***

**Pre-compression parameters**

The tablet blends, were evaluated for their bulk density, tapped density, Carr's index and flow properties.

**Post-compression parameters**

The compressed tablets were evaluated for the tests such as weight variation, thickness hardness, friability, *in vitro* disintegration and *in vitro* dissolution rate as per the pharmacopoeia standards; also specific tests for the evaluation of mouth dissolving tablets like wetting time and water absorption ratio were performed.

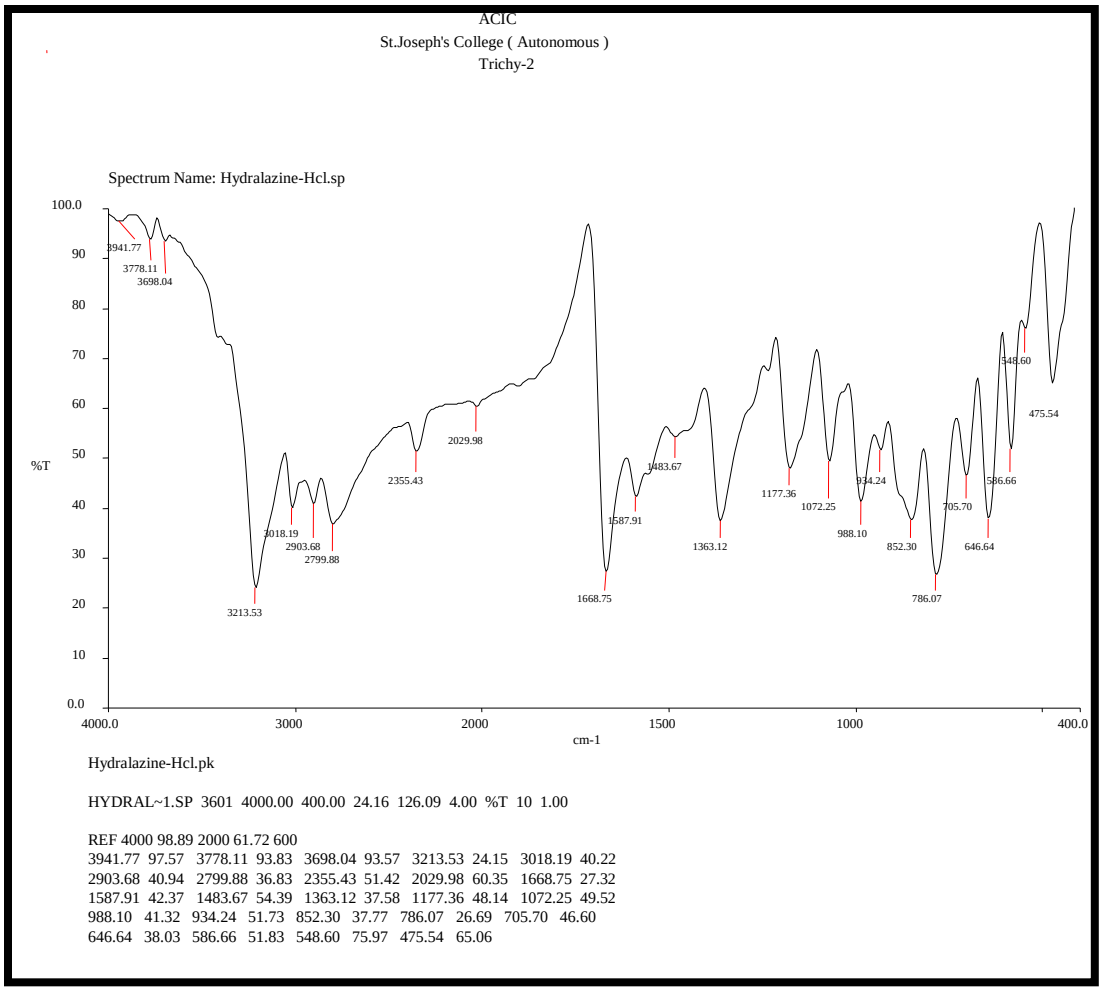
*In-vitro* drug release profile were fitted with various kinetic equations like Higuchi, Hixson, Crowell model, Korsmeyer and Peppas equation to understand the drug release kinetics from the dosage form.

**Stability studies**

Stability studies of the formulated oro-dispersible tablets were performed as per the ICH guidelines under accelerated condition 40 ± 0.2°C/75 ± 5% RH and evaluated for its stability [22].

## RESULTS AND DISCUSSION

The FTIR spectra shown in Figures 1 and 2 of the drug, which powdered tablet shows no significant change in the spectrum indicates the compatibility of the drug and excipient [23].




Hydralazine-Hcl.pk

HYDRAL~1.SP 3601 4000.00 400.00 24.16 126.09 4.00 %T 10 1.00

REF 4000 98.89 2000 61.72 600
3941.77 97.57 3778.11 93.83 3698.04 93.57 3213.53 24.15 3018.19 40.22
2903.68 40.94 2799.88 36.83 2355.43 51.42 2029.98 60.35 1668.75 27.32
1587.91 42.37 1483.67 54.39 1363.12 37.58 1177.36 48.14 1072.25 49.52
988.10 41.32 934.24 51.73 852.30 37.77 786.07 26.69 705.70 46.60
646.64 38.03 586.66 51.83 548.60 75.97 475.54 65.06

**Figure 1:** FTIR spectrum of hydralazine hydrochloride.

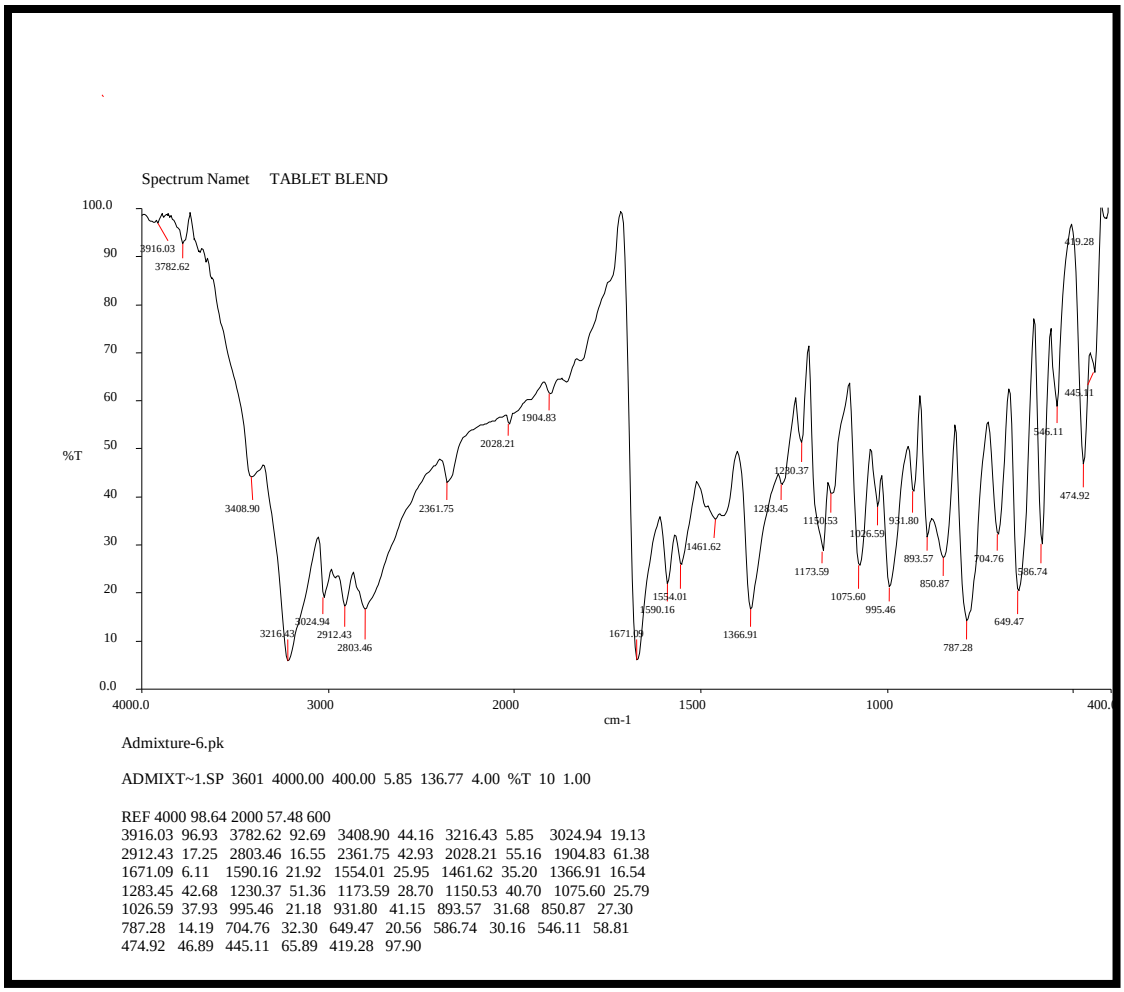



**Figure 2:** FTIR spectrum of ODTs prepared by direct compression method.

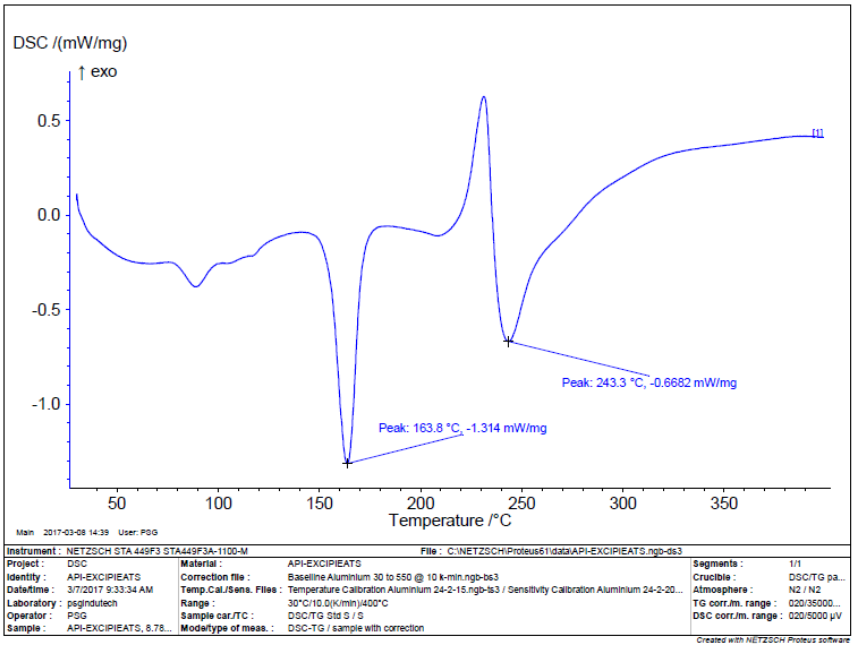



**Figure 3:** DSC of ODTs prepared by direct compression method.

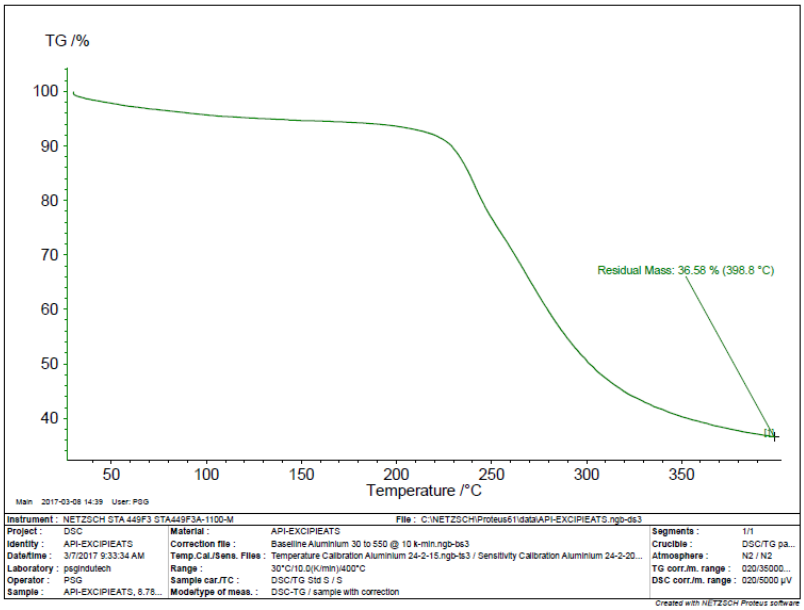



**Figure 4:** TGA of ODTs prepared by direct compression method.

DSC and TGA graph shown in (Figures 3 and 4) of the drug and the tablet blend shows no extra peaks. Hence it can be concluded that there was no physical interaction of drug and the excipient.

**Table 1:** Formula orodispersible tablets (ODTs) of hydralazine hydrochloride by direct compression method [23].

| S. No | Ingredients Used | Formulation code (tablet in mg) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F1 | F2 | F3 | F4 | F5 | F6 | F7 | F8 | F9 |
| 01. | Hydralazine HCL | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 02. | Croscarmellose sodium | 8 | 10 | 12 | - | - | - | - | - | - |
| 03. | Crospovidone | - | - | - | 8 | 10 | 12 | - | - | - |
| 04. | Sod. Starch glycolate | - | - | - | - | - | - | 8 | 10 | 12 |
| 05. | Aspartame | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 06. | Mannitol | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| 07. | Magnesium Stearate | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 08. | MCC | 83 | 81 | 79 | 83 | 81 | 79 | 83 | 81 | 79 |
| 09. | Talc | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Weight of the tablet | | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |

**Table 2:** Pre-compression parameters for various formulas.

| Batch code | Angle of repose (θ) | Bulk Density ($g/cm^3$) | Tapped Density ($g/cm^3$) | Carr's Index (%) | Hausner's Ratio |
|---|---|---|---|---|---|
| API | 24.76 ± 0.18 | 0.31 ± 0.06 | 0.34 ± 0.08 | 08.82 ± 0.07 | 1.09 ± 0.02 |
| F1 | 37.97 ± 0.16 | 0.33 ± 0.10 | 0.39 ± 0.10 | 15.38 ± 0.06 | 1.18 ± 0.03 |
| F2 | 36.02 ± 0.26 | 0.31 ± 0.10 | 0.42 ± 0.08 | 26.19 ± 0.09 | 1.19 ± 0.02 |
| F3 | 35.06 ± 0.11 | 0.36 ± 0.05 | 0.40 ± 0.03 | 10.00 ± 0.17 | 1.35 ± 0.01 |
| F4 | 34.09 ± 0.13 | 0.34 ± 0.06 | 0.43 ± 0.01 | 21.95 ± 0.68 | 1.18 ± 0.02 |
| F5 | 34.64 ± 0.28 | 0.33 ± 0.03 | 0.41 ± 0.03 | 19.51 ± 0.66 | 1.26 ± 0.03 |
| F6 | 26.06 ± 0.26 | 0.32 ± 0.05 | 0.39 ± 0.03 | 17.94 ± 0.42 | 1.17 ± 0.01 |
| F7 | 34.24 ± 0.33 | 0.32 ± 0.11 | 0.34 ± 0.10 | 05.88 ± 0.08 | 1.21 ± 0.01 |
| F8 | 36.96 ± 0.31 | 0.34 ± 0.10 | 0.38 ± 0.11 | 10.52 ± 0.04 | 1.11 ± 0.02 |
| F9 | 38.08 ± 0.23 | 0.35 ± 0.10 | 0.41 ± 0.05 | 14.63 ± 0.07 | 1.17 ± 0.03 |

***Pre-compression parameters***

The data obtained for pre-Compression parameters such as bulk density, tapped density, Hausner ratio, Carr's index and angle of repose are shown in Tables 2 and 3 were found to be within the prescribed limits and indicated good free flowing properties.

**Table 3:** Post-compression parameters.

| **Parameters** | **F1** | **F2** | **F3** | **F4** | **F5** | **F6** | **F7** | **F8** | **F9** |
|---|---|---|---|---|---|---|---|---|---|
| Weight variation test (mg) | 200 ± 0.98 | 201 ± 0.76 | 199 ± 0.63 | 197 ± 0.73 | 201 ± 0.66 | 199 ± 0.84 | 200 ± 0.65 | 201 ± 0.94 | 201 ± 0.84 |
| Thickness (mm) | 2.9 ± 0.02 | 2.8 ± 0.01 | 3.0 ± 0.02 | 3.1 ± 0.04 | 3.5 ± 0.03 | 3.7 ± 0.02 | 2.4 ± 0.08 | 2.5 ± 0.02 | 2.8 ± 0.09 |
| Hardness test ($kg/cm^3$) | 2.7 ± 0.33 | 2.8 ± 0.12 | 3.0 ± 0.24 | 3.1 ± 0.2 2 | 3.5 ± 0.31 | 3.7 ± 0.42 | 2.4 ± 0.17 | 2.5 ± 0.19 | 2.8 ± 0.27 |
| Friability (%) | 0.56 ± 0.17 | 0.42 ± 0.22 | 0.51 ± 0.25 | 0.29 ± 0.17 | 0.53 ± 0.23 | 0.56 ± 0.27 | 0.72 ± 0.19 | 0.77 ± 0.14 | 0.79 ± 0.21 |
| Disintegration time (sec) | 48 ± 0.84 | 42 ± 0.64 | 40 ± 0.68 | 32 ± 0.92 | 30 ± 0.87 | 26 ± 0.68 | 55 ± 0.83 | 53 ± 0.84 | 50 ± 0.73 |
| Wetting time (sec) | 46 ± 0.36 | 40 ± 0.91 | 39 ± 0.44 | 30 ± 0.64 | 28 ± 0.92 | 22 ± 0.54 | 51 ± 0.43 | 50 ± 0.56 | 48 ± 0.82 |
| Water absorption (%) | 71.41 ± 0.73 | 70.43 ± 0.61 | 74.98 ± 0.47 | 84.32 ± 0.65 | 88.32 ± 0.94 | 92.87 ± 0.91 | 64.32 ± 0.43 | 65.42 ± 0.74 | 68.50 ± 0.53 |
| Drug content (%) | 92.16 ± 0.36 | 94.68 ± 0.24 | 97.14 ± 0.42 | 97.01 ± 0.44 | 98.42 ± 0.67 | 99.98 ± 0.56 | 88.48 ± 0.37 | 90.50 ± 0.25 | 91.87 ± 0.52 |

All the post compression parameters like weight variation, thickness, hardness, friability, wetting time, water absorption ratio assay, wetting time, *in vitro* disintegration time, *in-vitro* drug dissolution study are mentioned in Table 4 and Figure 5 were within the IP acceptable limits. The tablets weight variation for the optimized formulation F9 of Orodispersible tablets prepared by direct compression method was measured in the range of 201 ± 0.94 mg. Thickness was in the range of 2.8 ± 0.09 hardness in the range of 2.8 ± 0.27 $kg/cm^2$. The percentage friability was less than 1% for all formulations ensuring mechanical stability of the formulated tablets.

All formulations were evaluated for percentage drug content and found in the range of 91.87 ± 0.52 indicating the compliance with the Pharmacopoeia limits. According to the Pharmacopoeia standards the dispersible tablet must disintegrate within 3 min, but all formulated batches have shown very low disintegration time i.e., 50 ± 0.73 seconds indicating suitability of formulation for ODTs. Wetting time found in the range of 48 ± 0.82 seconds, water absorption ratio was 68.50 ± 0.53 percentages. *In vitro* study was found to be optimum for the formulation F9 in the range of 95.59 ± 0.64 percentages at 12 min (Table 5).

**Table 4:** Comparative *In-vitro* dissolution study of ODTs prepared by direct compression method [23].

| | Time (min) | | | | | | |
|---|---|---|---|---|---|---|---|
| **Formulation code** | **0** | **2** | **4** | **6** | **8** | **10** | **12** |
| F1 | 2.27 ± 0.65 | 11.29 ± 0.59 | 30.13 ± 0.64 | 51.27 ± 0.82 | 60.13 ± 0.84 | 76.52 ± 0.58 | 91.80 ± 0.45 |
| F2 | 3.00 ± 0.46 | 16.69 ± 0.62 | 34.41 ± 0.38 | 45.95 ± 0.59 | 54.68 ± 0.67 | 65.70 ± 0.43 | 87.43 ± 0.58 |
| F3 | 5.61 ± 0.54 | 18.40 ± 0.36 | 31.66 ± 0.45 | 45.68 ± 0.78 | 54.90 ± 0.58 | 76.85 ± 0.63 | 92.86 ± 0.39 |
| F4 | 5.34 ± 0.55 | 15.40 ± 0.53 | 25.00 ± 0.64 | 46.93 ± 0.39 | 60.13 ± 0.55 | 71.53 ± 0.57 | 88.88 ± 0.64 |
| F5 | 7.80 ± 0.37 | 17.91 ± 0.71 | 37.50 ± 0.59 | 49.71 ± 0.52 | 64.99 ± 0.73 | 76.52 ± 0.80 | 94.30 ± 0.61 |
| F6 | 5.20 ± 0.64 | 20.80 ± 0.83 | 38.20 ± 0.55 | 51.57 ± 0.68 | 62.80 ± 0.63 | 76.82 ± 0.43 | 95.34 ± 0.55 |
| F7 | 5.75 ± 0.81 | 18.57 ± 0.45 | 32.61 ± 0.58 | 45.68 ± 0.85 | 64.82 ± 0.52 | 72.98 ± 0.55 | 85.25 ± 0.43 |
| F8 | 5.26 ± 0.58 | 22.17 ± 0.51 | 33.81 ± 0.39 | 49.55 ± 0.78 | 62.72 ± 0.64 | 78.43 ± 0.76 | 89.75 ± 0.57 |
| F9 | 4.39 ± 0.57 | 21.98 ± 0.67 | 36.84 ± 0.54 | 49.55 ± 0.66 | 72.68 ± 0.63 | 79.30 ± 0.82 | 95.59 ± 0.64 |

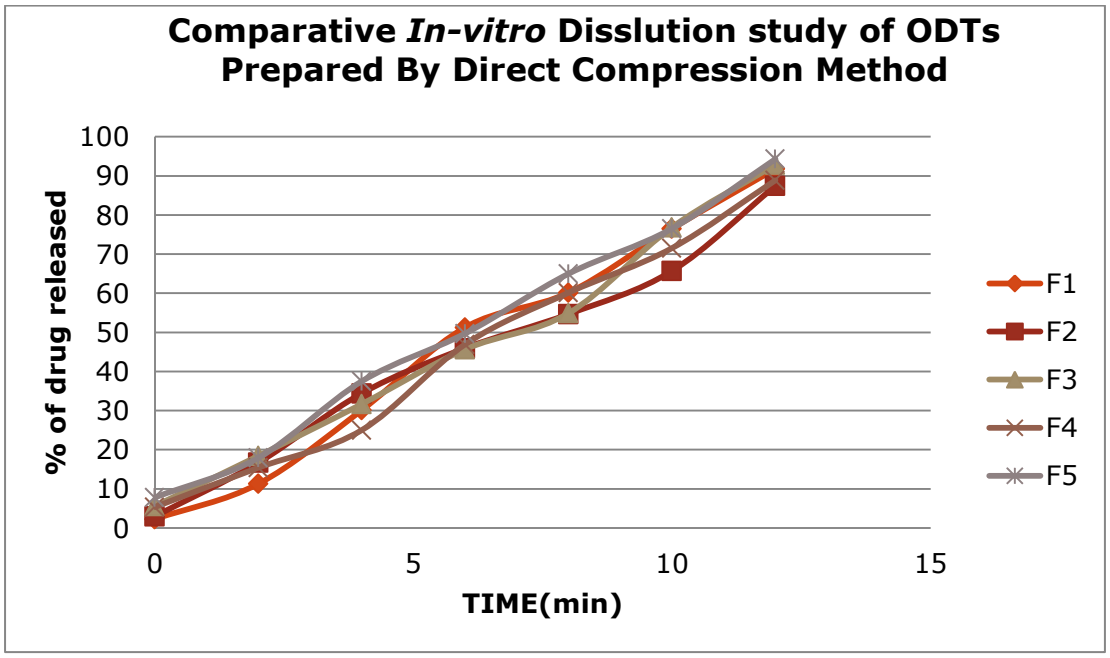



**Figure 5:** *In-vitro* dissolution study.

**Table 5:** Stability study for optimized formulation F9 prepared by direct compression method.

| S. No | Parameters | Initial | Stored at 40˚C ± 2˚C and 75% ± 5% RH in month | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | Description | White colour | White colour | White colour | White colour | White colour | White colour | White colour |
| 2 | Average weight (mg) | 201 | 201 | 201 | 202 | 202 | 202 | 202 |
| 3 | Friability (%) | 0.26 | 0.26 | 0.28 | 0.29 | 0.27 | 0.26 | 0.31 |
| 4 | Hardness ($kg/cm^2$) | 3.7 | 2.6 | 2.6 | 2.5 | 2.6 | 2.6 | 2.5 |
| 5 | Disintegration time (sec) | 26 | 26 | 27 | 27 | 26 | 26 | 27 |
| 6 | Drug content (%) | 99.98 | 99.97 | 99.95 | 99.94 | 99.8 | 99.16 | 99.03 |

**Table 6:** Comparative *in-vitro* dissolution profile of ODTs of Hydralazine HCL (F9) prepared by direct compression method, before and after storage at 40˚C ± 2˚C to 75% ± 5% RH.

| Time in minutes | Cumulative % of drug released ( ± S.D) n=6 | | | | | | |
|---|---|---|---|---|---|---|---|
| | Initial | 1st month | 2nd month | 3rd month | 4th month | 5th month | 6th month |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | 14.64 ± 1.25 | 14.68 ± 1.34 | 14.45 ± 1.22 | 14.34 ± 1.20 | 14.28 ± 5.42 | 13.55 ± 2.03 | 14.79 ± 5.26 |
| 4 | 44.05 ± 1.47 | 44.01 ± 2.17 | 43.98 ± 1.40 | 43.68 ± 1.31 | 43.31 ± 1.477 | 43.67 ± 2.60 | 44.66 ± 1.79 |
| 6 | 72.52 ± 0.65 | 72.50 ± 0.81 | 71.23 ± 0.44 | 72.01 ± 0.12 | 71.50 ± 0.61 | 72.33 ± 0.78 | 72.63 ± 0.97 |
| 8 | 83.29 ± 0.69 | 83.29 ± 0.67 | 82.18 ± 0.58 | 83.14 ± 0.24 | 82.86 ± 0.14 | 83.16 ± 0.62 | 82.44 ± 0.74 |
| 10 | 89.78 ± 0.58 | 89.70 ± 0.86 | 89.56 ± 0.72 | 89.10 ± 0.24 | 89.70 ± 0.13 | 89.84 ± 0.22 | 89.68 ± 0.52 |
| 12 | 90.20 ± 0.58 | 90.10 ± 0.24 | 90.01 ± 0.64 | 89.92 ± 0.82 | 89.65 ± 0.35 | 89.30 ± 0.12 | 89.42 ± 0.52 |

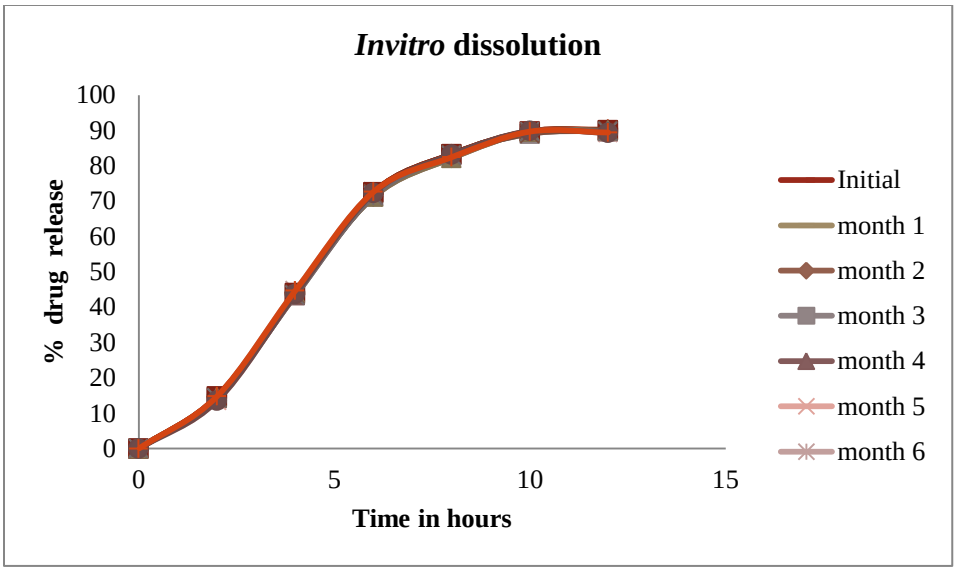



**Figure 6:** Comparative *in-vitro* dissolution profile of ODTs of Hydralazine HCL (F9) prepared by direct compression method, before and after storage at 40˚C ± 2˚C to 75% ± 5% RH.

Stability results represented in Table 6 and Figure 6 also indicated that the optimized formulation F9 shows better stability under accelerated condition as per the Pharmacopoeia standards.

## CONCLUSION

From this study F9 concluded as optimized and stable formulations from the results of post compression parameters along with an effective percentage of drug release within 12 minutes indicating faster and maximum absorption at the site of administration.

## ACKNOWLEDGEMENT

The authors are thankful to the managing trustee Karpagam institutions. We are thankful to, The Faculty of Pharmacy, Karpagam Academy of Higher Education, Karpagam University, Pollachi road, Coimbatore, for providing us the facilities for carrying out the research work.

## REFERENCES

1. Arijit G. Orodispersible tablets: A new venture in modern formulation technology. *The Pharma Innovation*, **2012.** 1(8):14-31.
2. Dutta, S., and De, P. Formulation of fast disintegrating tablets. *Int J Drug Formulation& Res,* **2011.** 2(1): 45-51.
3. Dinesh, V., Sharma, I., and Sharma, V., A comprehensive review on fast dissolving tablet. **2010.**

4. Devi, K.N, Rani, P.A, Saimrudula, B. Formulation and evaluation of oral disintegrating tablets of montelukast sodium: Effect of functionality of super disintegrants. *J pharma Res*. **2010.** 3(4):803-808.
5. Dinesh, S., Vanitha, K., Ramesh, A., et al. Formulation and evaluation of salbutamiol sulphate fast dissolving tablet. Int *J Res Pharma Bio Sci*. **2010.** 1(2):105-108.
6. Jeevanandham, S., Dhachinamoorthy, D., Chandra, K.B., et al. J. Formulation and evaluation of naproxen sodium orodispersible tablets-A sublimation technique. *Asian J Pharma*. **2010.** 4(1):48-51.
7. www.wikipedia.org/wiki/Preeclampsia
8. www.wikipedia.org/wiki/Eclampsia
9. Darci, R., Block, A.K., Prediction, diagnosis and management beyond proteinuria and hypertension. *Clinical Laboratory News*, **2010.** 36(2).
**10.** Sibai, BM., Hypertensive disorders in women. **2001.**
11. Witlin, A.G., Sibai B.M., Magnesium sulfate therapy in preeclampsia and eclampsia. Obstet Gynecol, **1998.** 92: 883-9.
12. Sibai, B.M., Diagnosis and management of gestational hypertension and preeclampsia. Obstet Gynecol, **2003.** 102: 181-92.
13. Sibai, B.M., Diagnosis, prevention, and management of eclampsia. Obstet Gynecol, **2005.** 105: 402-10.
14. Bhowmik, D., Chiranjib, B., and Krishnakanth, P., et al. Fast dissolving tablet: An overview. *J Chemical Pharma Res*, **2009.** 1(1): 163-177.
15. Bourne, D.W., Pharmacokinetics. In: Banker G.S, Rhodes C.T, Modern Pharmaceutics, (4th edn). New York, Ny: *Marcel Dekker Inc*, **2002.** 67-92.
16. Indian Pharmacopeia 1996 Volume-01 Published by the controller of publication civil line, Delhi. General Notice. Page No.07.
17. Devendra, R.R., Hemant N.G., and Vikash, V.P., et al. Formulation and evaluation of fast dissolving tablets of Albendazole. *Int Curr Pharm J*, **2012.** 1(10): 311-316.
18. Patel, C.J., Asija, R., and Mangukia, D., et al. Formulation and evaluation of orodispersible tablets of Diazepam using different super-disintegrants. *Int Res J Pharm*, **2012.** 3(3): 298-301.
19. Raghavendra, N.G., Mahesh, K., Srikanth, M., et al. Development and evaluation of fast dissolving tablets of Fosinopril by sublimation method. *Int J Pharm Sci Drug Res*, **2012.** 4(4): 230-235.
20. Bhunia, B., Varun, J., Formulation and evaluation of orodispersible tablet of Amlodipine besylate. *Int J Pharm Tech*, **2011.** 3(4): 3745-3766.
*21.* Amitesh, K.P., Satyendra, K., and Asish, K., et al. Formulation and evaluation of mouth dissolving tablets of Chlorpromazine HCL. *Int J Pharm Biological Archives*, **2011.** 2(4):1175-1178
22. David, J., Mazzo. "International stability testing". Inter pharm press, Bangalore; 1-13.
23. Muthukumar, S., and Ganapathy R.S, Design and evaluation of hydralazine hydrochloride mouth dissolving tablet forth management of hypertension. *Int J Recent Sci Res.* **2011.** 8(5): 17230-17235.