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Research Article

Formulation and Evaluation of Polyherbal Orodispersible Tablets for Antidiabetic Activity

Rujuta Shinde*, Ganesh Jadhav, Renuka Kurund, Omkar Jatti, Komal Jadhav, Ghamgale Suhas, Dr. Ramesh Ingole

DJPS College of Pharmacy Pohetakli, Maharashtra, India

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ABSTRACT

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The present study aimed to formulate and evaluate polyherbal orodispersible tablets for antidiabetic activity using herbal ingredients such as Syzygium cumini, Phyllanthus emblica, Ocimum sanctum, Clitoria ternatea, and Cinnamomum zeylanicum. Herbal extracts were prepared by maceration method using hydroalcoholic solvent system and tablets were pre pared by direct compression method using crospovidone as superdisintegrant. The prepared formulations were evaluated for preformulation and post-compression parameters including angle of repose, bulk density, tapped density, hardness, friability, disintegration time, wetting time, drug content, and in-vitro dissolution studies. Among all formulations, F3 showed the best performance with rapid disintegration and maximum drug release. The study concluded that the developed polyherbal orodispersible tablets possess promising antidiabetic potential with improved patient compliance and rapid onset of action.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder characterized by elevated blood glucose levels resulting from defects in insulin secretion, insulin action, or both. It is one of the most prevalent non -communicable diseases worldwide and is associated with serious complications such as neuropathy, nephropathy, retinopathy, and cardiovascular disorders [1,2]. The increasingprevalence of diabetes and limitations associated with conventional antidiabetic therapy have encouraged the development of safer and more effective alternative approaches including herbal formulations.

Herbal medicines have gained considerable attention due to their natural origin, reduced side

***Corresponding Author:** Rujuta Shinde
Address: *DJPS College of Pharmacy Pohetakli, Maharashtra, India*
Email : rujutas23@gmail.com
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effects, cost effectiveness, and therapeutic potential in the management of diabetes mellitus. Medicinal plants such as Syzygium cumini (Jamun), Phyllanthus emblica (Amla), Ocimum sanctum (Tulsi), Cinnamomum zeylanicum (Cinnamon), and Clitoria ternatea (Gokarn) possess significant antidiabetic and antioxidant activities [3 –5].

Orodispersible tablets (ODTs), also known as mouth dissolving tablets, are solid dosage forms that rapidly disintegrate or dissolve in saliva without the need for water. These formulations improve patient compliance, particularly in paediatric, geriatric, and dysphagic patients experiencing difficulty in swallowing conventional tablets [6,7]. ODTs provide rapid onset of action, improved bioavailability, and enhanced patient convenience.

The present study was aimed at formulation and evaluation of herbal orodispersible tablets for antidiabetic activity using selected herbal extracts prepared by maceration method and formulated by direct compression technique. The prepared formulations were evaluated for preformulation and post-compression parameters to identify optimized formulation with improved pharmaceutical properties.

2. MATERIALS AND METHODS

2.1 Materials

The herbal drugs used in the present study included Jamun seed, Amla, Cinnamon, Tulsi, Gokarn, Cardamom, and Stevia. Crospovidone was used as superdisintegrant, while Microcrystalline Cellulose (MCC), Mannitol, Magnesium stearate, and Talc were used as pharmaceutical excipients. All chemicals and reagents used were of analytical grade.

2.2 Preparation of Herbal Extract

The selected herbal drugs were shade dried and coarsely powdered separately. The powdered materials were extracted using hydroalcoholic solvent system (ethanol: water, 70:30 v/v) by maceration method for 5 days with occasional shaking. The obtained extracts were filtered and concentrated using water bath. The dried extracts were stored in airtight containers for further use.

2.3 Formulation of Orodispersible Tablets

Herbal orodispersible tablets were prepared by direct compression method. All ingredients were accurately weighed and passed through sieve no. 60. The ingredients were mixed uniformly and magnesium stearate was added at the final stage. The prepared powder blend was compressed into tablets of 500 mg weight using tablet compression machine.

2.4 Formulation Composition

Ingredient	F1	F2	F3
Jamun Seed	100	120	140
Amla	15	15	10
Cinnamon	15	12	12
Tulsi	25	20	10
Gokarn	25	10	20
Cardamom	5	5	5
Stevia	3	3	3
Crospovidone	30	30	30
MCC	107	112	114
Mannitol	170	168	151
Magnesium Stearate	5	5	5
Total	500 mg	500 mg	500 mg

2.5 Evaluation Parameters

The prepared powder blend was evaluated for angle of repose, bulk density, tapped density, Carr's index, and Hausner's ratio. The formulated tablets were evaluated for general appearance, weight variation, thickness, hardness, friability, disintegration time, wetting time, water absorption

ratio, drug content, in-vitro dissolution study, and stability studies according to standard procedures.

3. RESULTS

3.1 Extraction Yield

The percentage yield of herbal extracts obtained by maceration method is shown in Table 1.

Table 1: Percentage Yield of Herbal Extracts

Drug	% Yield
Jamun Seed	18 %
Amla	22 %
Cinnamon	15 %
Tulsi	20 %
Gokarn	17 %
Cardamom	14 %

3.2 Preformulation Studies

The prepared powder blend was evaluated for preformulation parameters and results are shown in Table 2**.**

Table 2: Preformulation Study Parameters

Parameter	Value
Angle of Repose	27.1°
Bulk Density	0.40 g/ml
Tapped Density	0.50 g/ml
Carr's Index	20%
Hausner's Ratio	1.25

3.3 Evaluation of Orodispersible Tablets

i. General Appearance

The prepared tablets showed light brown colour, round shape, smooth surface, and pleasant odour.

ii. Weight Variation

Table 3: Weight Variation Test

Table No.	Weight (mg)
1	498
2	502
3	499
4	501
5	500
6	497
7	503
8	499
9	501
10	503

Average Weight = 500 mg

iii. Thickness

Table 4: Thickness Test

Table No.	Thickness
1	3.4 mm
2	3.5 mm
3	3.3 mm
4	3.4 mm
5	3.5 mm

Average Thickness = 3.42 mm

iv. Hardness

Table 5: Hardness Test

Table No.	Hardness
1	3.2 kg/cm^2
2	3.5 kg/cm^2
3	3.3 kg/cm^2
4	3.4 kg/cm^2
5	3.3 kg/cm^2

Average Hardness = 3.34 kg/cm²

v. Friability

Table 6: Friability Test

Initial Weight	Final Weight	% Friability
6.50 g	6.44 g	0.92%

vi. Disintegration Time

Table 7: Disintegration Time

Formulation	Time (sec)
F1	28
F2	25
F3	22

vii. Wetting Time and Water Absorption Ratio

Table 8: Wetting Time and Water Absorption Ratio

Formulation	Wetting Time (sec)	Water Absorption (%)
F1	30	65
F2	35	72
F3	26	78

viii. Drug Content

Table 9: Drug Content

Formulation	% Drug Content
F1	96.5
F2	98.2
F3	99.1

ix. In-vitro Dissolution Study

Table 10: In-vitro Dissolution Study

Time (min)	F1 %	F2 %	F3 %
5	45	52	60
10	65	72	80
15	82	88	95

x. Stability Studies

The prepared formulationswere subjectedto stability studies under different storage conditions.

Table 11: Stability Studies

Time	Observation
0 Days	No Change
15 Days	No Change
30 Days	Slight increase in hardness

4. DISCUSSION

Among all formulations, F3 demonstrated superior performance with fastest disintegration time, highest water absorption ratio, and maximum drug release. The improved performance may be attributed to optimized concentration of crospovidone and suitable excipient composition. The prepared herbal orodispersible tablets showed satisfactory physicochemical characteristics and rapid drug release profile suitable for antidiabetic drug delivery.

5. CONCLUSION

The present study successfully formulated and evaluated herbal orodispersible tablets for antidiabetic activity using selected herbal extracts such as Jamun seed, Amla, Cinnamon, Tulsi, Gokarn, Cardamom, and Stevia. The tablets were prepared by direct compression method using crospovidone as superdisintegrant.

The prepared formulations showed satisfactory preformulation and post-compression parameters including hardness, friability, disintegration time, wetting time, drug content, and dissolution characteristics. Among all formulations, F3 exhibited better performance with rapid disintegration and maximum drug release.

The study concluded that herbal orodispersible tablets can serve as a promising alternative dosage form for antidiabetic therapy with improved patient compliance and rapid drug release characteristics.

REFERENCES

1. World Health Organization. Global Report on Diabetes. Geneva: WHO; 2019.
2. American Diabetes Association. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes. Diabetes Care. 2022;45(Suppl 1):S17-S38.
3. Salehi B, Ata A, Kumar NVA, et al. Antidiabetic medicinal plants and active compounds. Biomolecules. 2019;9(10):551.
4. Dwivedi C, Daspaul S. Antidiabetic herbal drugs review. J Phytopharmacol. 2013;2(3):44-51.
5. Baliga MS, Bhat HP, Baliga BRV, Wilson R, Palatty PL. Phytochemistry and medicinal uses of Eugenia jambolana. Food Res Int. 2011;44(7):1776-1789.

6. Fu Y, Yang S, Jeong SH, Kimura S, Park K. Orally fast disintegrating tablets. Crit Rev Ther Drug Carrier Syst. 2004;21(6):433-476.
7. Hirani JJ, Rathod DA, Vadalia KR. Orally disintegrating tablets review. Trop J Pharm Res. 2009;8(2):161-172.
8. Kumar A, Ilavarasan R, Jayachandran T, et al. Antidiabetic activity of Syzygium cumini seeds. J Med Plants Res. 2008;2(9):246-249.
9. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of Industrial Pharmacy. 4th ed. CBS Publishers; 2013.
10. Aulton ME, Taylor KMG. Aulton's Pharmaceutics: The Design and Manufacture of Medicines. 5th ed. Elsevier; 2018.
11. Indian Pharmacopoeia Commission. Indian Pharmacopoeia. Ghaziabad: IPC; 2022.
12. United States Pharmacopeia. USP-NF. Rockville: United States Pharmacopeial Convention; 2021.
13. ICH Harmonised Guideline Q1A(R2): Stability Testing of New Drug Substances and Products. Geneva; 2003.
14. Kokate CK. Practical Pharmacognosy. 5th ed. Vallabh Prakashan; 2014.
15. Khandelwal KR. Practical Pharmacognosy Techniques and Experiments. 25th ed. Nirali Prakashan; 2017.
16. Harborne JB. Phytochemical Methods. 3rd ed. Springer; 2008.
17. Khan A, Safdar M, Ali Khan MM, et al. Cinnamon improves glucose and lipids in diabetes. Diabetes Care. 2003;26(12):3215-3218.
18. Pattanayak P, Behera P, Das D, Panda SK. Ocimum sanctum Linn review. Pharmacogn Rev. 2010;4(7):95-105.
19. Chatsudthipong V, Muanprasat C. Therapeutic benefits of Stevia compounds. Pharmacol Ther. 2009;121(1):41-54.
20. Mukherjee PK, Kumar V, Kumar NS, Heinrich M. Clitoria ternatea: Traditional use and scientific assessment. J Ethnopharmacol. 2008;120(3):291-301.
21. Bhowmik D, Chiranjib B, Krishnakanth P, Chandira RM. Fast dissolving tablet: An overview. J Chem Pharm Res. 2009;1(1):163-177.
22. Seager H. Drug-delivery products and Zydis fast dissolving dosage form. J Pharm Pharmacol. 1998;50(4):375-382.
23. Chang RK, Guo X, Burnside BA, Couch RA. Fast dissolving tablets. Pharm Technol. 2000;24(6):52-58.
24. Gohel MC, Patel MM, Amin AF, et al. Formulation design and optimization of mouth dissolve tablets. Indian J Pharm Sci. 2004;66(2):211-215.
25. Kuchekar BS, Badhan AC, Mahajan HS. Mouth dissolving tablets: A novel drug delivery system. Pharma Times. 2003;35:7-9.
26. Arya A, Chandra A, Sharma V, Pathak K. Fast dissolving oral films: An innovative drug delivery system. Int J ChemTech Res. 2010;2(1):576-583.
27. Patel DM, Patel MM. Optimization of fast dissolving tablets prepared by sublimation technique. Indian J Pharm Sci. 2008;70(1):71-76.
28. Mishra DN, Bindal M, Singh SK, Kumar SG. Spray dried excipient base: A novel technique for fast dissolving tablets. Indian Drugs. 2006;43(6):516-519.
29. Sharma S, Lewis S. Taste masking technologies in mouth dissolving tablets. Drug Dev Ind Pharm. 2020.
30. Rowe RC, Sheskey PJ, Quinn ME. Handbook of Pharmaceutical Excipients. 6th ed. Pharmaceutical Press; 2009.
31. Allen LV, Popovich NG, Ansel HC. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems. 9th ed. Lippincott Williams & Wilkins; 2011.

32. Banker GS, Anderson NR. Tablets. In: Lachman L, Lieberman HA, Kanig JL, editors. The Theory and Practice of Industrial Pharmacy. CBS Publishers; 2013.
33. Dobetti L. Fast-melting tablets: Developments and technologies. Pharm Technol Europe. 2001;13(9):44-50.
34. Habib W, Khankari R, Hontz J. Fast dissolve drug delivery systems. Crit Rev Ther Drug Carrier Syst. 2000;17(1):61-72.
35. Kaushik D, Dureja H, Saini TR. Mouth dissolving tablets: A review. Indian Drugs. 2004;41(4):187-193.
36. Sastry SV, Nyshadham JR, Fix JA. Recent technological advances in oral drug delivery. Pharm Sci Technol Today. 2000;3(4):138-145.
37. Velmurugan S, Sundar V. Oral disintegrating tablets: An overview. Int J Chem Pharm Sci. 2010;1(2):1-12.
38. Bandari S, Mittapalli RK, Gannu R, Rao YM. Orodispersible tablets: An overview. Asian J Pharm. 2008;2(1):2-11.
39. Bi YX, Sunada H, Yonezawa Y, et al. Preparation and evaluation of compressed tablets rapidly disintegrating in oral cavity. Chem Pharm Bull. 1996;44(11):2121-2127.
40. Elakkiyamani R, Kumar S, Devi P. Formulation and evaluation of herbal mouth dissolving strips. Pharm Innov J. 2025;14(2):110-118.
41. Surve A, Patil P, More S. Herbal oral thin films for antidiabetic activity. Int J Pharm Res. 2025;17(1):55-62.
42. Deep P, Sharma A, Kumar M. Formulation and evaluation of polyherbal antidiabetic tablets. Int J Herb Med. 2022;10(2):15-22.
43. Ranasinghe P, Pigera S, Premakumara GAS, et al. Medicinal properties of true cinnamon. BMC Complement Altern Med. 2013;13:275.
44. Cohen MM. Tulsi (Ocimum sanctum): A herb for all reasons. J Ayurveda Integr Med. 2014;5(4):251-259.
45. Gupta E, Purwar S, Sundaram S, Rai GK. Nutritional and therapeutic values of Stevia rebaudiana. J Med Plants Res. 2013;7(46):3343-3353.
46. Daisy P, Santosh K, Rajathi M. Antihyperglycemic effects of Clitoria ternatea. Afr J Microbiol Res. 2009;3(5):287-291.
47. Krishnaveni M, Mirunalini S. Therapeutic potential of Phyllanthus emblica. J Basic Clin Physiol Pharmacol. 2010;21(1):93-105.
48. Ravi K, Ramachandran B, Subramanian S. Antidiabetic activity of Syzygium cumini seed extract. J Ethnopharmacol. 2004;91(1):143-149.
49. WHO. Quality control methods for medicinal plant materials. Geneva: World Health Organization; 2011.
50. Handa SS, Khanuja SPS, Longo G, Rakesh DD. Extraction technologies for medicinal and aromatic plants. International Centre for Science and High Technology; 2008.

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