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Formulation and Evaluation of Polyherbal Antidiabetic Tablet

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Abstract: *Fast dissolving drug delivery system offers a solution for those patients having difficulty inswallowing. The concept of Fast dissolving Drug Delivery System emerged from the desire toprovide patient with more conventional means of taking their medication. It is difficult for many patients to swallow tablets and hard gelatin capsules. Hence they do not comply with prescription,which results in high incidence of non-compliance and ineffective therapy. ODTs may also be used to deliver drugs to the oral cavity, for local action or, in some cases, absorption across the oral mucosa, thereby avoiding first-pass hepatic metabolism and potentially increasing the rate and extent of uptake, and reducing undesirable metabolites. This project is to make an effective solution on Diabetic condition and Edema with better therapeutic effects with minimum side effects. Herbal preparation is mostly used for preventing to that disease's conditions.*

Keywords: drug delivery

I. INTRODUCTION

Diabetes mellitus is one of the leading Metabolic diseases affecting almost 50% of elderly Population and a cause of death.The increase in cost With time is due to the increase in complications. The Costs of diabetes affect everyone, everywhere, and are a Major financial problem .Various studies were conducted in India for Economic burden of diabetics treatment which include Direct diabetics treatment and its related complications.

Diabetes is a metabolic disorder characterized by high glucose or above-normal glucose level (70–110 mg/dL) symptomatically with frequent urination, thirst, and hunger. The main causes are either less production of insulin by β-cells or reduced cell response to insulin (Singab, Youssef, & Ashour, 2014). Diabetes along with other cofactors increases the risk of obesity, heredity, aging, genetic mutilation of beta-cell function/insulin receptor, drug, and infection. According to International Diabetes Federation (IDF) survey report in 2016, approximately 415 million people were diabetic with a predicted population of 642 million to suffer from type 2 diabetes by 2040 (Al-Malki & El Rabey, 2015). In India, Aroma World reported 61.3 million diabetic people between the age group of 20–79 years and is further expected to increase by 2030. Diabetes is classified into 3 types according to the pathological causes: type 1 (T1DM) which characterized by less production of insulin due to damaged beta cell, type 2 (T2DM) that can affect any age group due to development of a condition where body becomes irresponsive or resistant of insulin and the third type is gestational diabetes that occurs during pregnancy (Monika, Sharma, & Yadav, 2016). Diabetes develops with time due to some specific health-related issues or might result from some external factors (environmental factors) which alone or in symbiotic association aggravates the complications, resulting in cardiovascular diseases, kidney diseases, eyes problem and ulceration of feet .

Continuous research efforts over the time have improved our understanding of the pathophysiology of diabetes and the scientists have successfully developed multiple pharmacological and non-pharmacological approaches for improving the glycemic control of the body (Tahrani, Piya, Kennedy, & Barnett, 2010).

The disease however, is very versatile with varied expression and progression which makes its control very difficult. Improvement of glycemic control using physiological aids may be the last option in the long list of treatments available. However, the adoption of healthy food choices for the overall management of health and a disease condition, in particular, becomes even more important (Jacobson, 2004; Tahrani et al., 2010).

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The development and progression of T2DM is mostly correlated with food habits. Once T2DM is diagnosed, the most important and critical part of treatment is lifelong adoption and close adherence to multiple self-care advice particularly by modification of dietary habits suggested by dieticians (Rao, Sreenivasulu, Chengaiah, Reddy, & Chetty, 2010). According to the Acharya Charak, a diet should be consumed which, besides providing basic nutrition to the body, can also help to maintain the healthy state of the body and prevents the occurrence of diseases (Daliu, Santini, & Novellino, 2019).

What is Diabetes?

• Diabetes is a disease that occurs when your blood glucose, also called blood sugar, is too high.Insulin is a hormone made by the pancreas that helps glucose get into your cells to be used for Energy. If you have diabetes, your body doesn‟t make enough or any insulin, or doesn‟t use insulin property

Types-

• Type-1 diabetes.
• Type-2 diabetes
• Gestational diabetes.

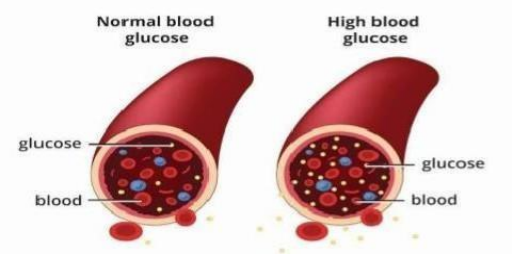

Fig.1

CAUSES

• Cells in muscle, fat and the liver become resistant To insulin As a result, the cells don‟t take in Enough sugar.
• The pancreas can‟t make enough insulin to keep Blood sugar levels within a healthy range.
• Being overweight and inactive are key contributing factors.

Fig.2

Edema caused in diabetes-

• diabetes is a chronic disease caused by the Body‟s inability to regulate and utilize ccirculatin Blood sugar.
• in both case of diabetes damage to vessels such As capillaries and veins results in poor Circulation. It leads to edema and on rare Occasions, can also cause leakage into the surrounding tissue.

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Fig.3

LITERATURE REVIEW

1. Rakesh Pahwa et.al (2017): They have study the super disintegrants used in the development of orally disintegrating tablets describes Orally disintegrating tablets are an emerging trend in novel drug delivery system and have received ever-increasing demand during the last few decades.

2. Martins Emeje et.al (2011): They studied compaction characteristics of the extract using the Heckel equation. The mechanical properties as well as disintegration and dissolution profile of the compacts were also assessed. The results showed that ADI exhibited very low densification due to dye filling and addition of filler-binders contributed significantly to their subsequent densification. The tablets produced had good mechanical properties

3. Vikas Kumar Gupta et.al (2021): They studied on zingiber officinale Roscoe, the scientific name for ginger, is a plant that in widely used as a spice, flavoring, and herbal treatment across the world. It is a member of the Zingiberezae family and traditional uses, T. Sampath Kumar etal (2021): They studied on formulation and Evaluation of in vitro antidiabetic Polyherbal tablets from some traditional used Herbs And describes Diabetes Mellitus is defined as heterogenous metabolic disorder charachterised by common feature of chronic hyperglycemia with disturbance of carbohydrate, protein and fat metabolism.

4. Sable Kundan Dattatray et.al (2020): They find patients might be drawn to the use of herbal remedies because they are encouraged to think of them as natural remedies, free from adverse effects. A 58-year-old woman of south Asian origin, with a 30- year history of type 2 diabetes, together with hypertension, hyper cholesteroaemia, chronic kidney disease, retnopathy, and a painful peripheral neuropathy, attended our clinic in November, 2017.Aim:

Formulation and evaluation of fast dissolving polyhebal antidiabetic tablet of syzygium cumini and zingiber officinale.

Objective :

A) Review disease process of Diabetes mellitus.

b) Discuss the role of insulin in metabolic process.

c) Discuss different types of anti-diabetic agents with their mode of action, side effects and care.

D) For better complaince of patients.

E) to reduce edema and maintain blood glucose levels.

F) to reduce inflammation in edema.

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Plan of Work

1. Literature Review

Review of antidiabetic properties of Syzygium cumini and Zingiber officinale Study of existing polyherbal formulations and herbal tablet preparation methods

2. Collection and Authentication of Plant Material

Procurement of Syzygium cumini seeds and Zingiber officinale rhizomes Authentication from a certified botanist or institution

3. Preparation of Extracts

Drying and powdering of plant materials

Extraction using suitable solvents (e.g., aqueous or hydroalcoholic) via maceration or Soxhlet extraction

Concentration and drying of extracts

4. Phytochemical Screening

Preliminary phytochemical tests for alkaloids, flavonoids, tannins, saponins, etc.

5. Formulation of Polyherbal Tablets

Selection of appropriate excipients

Preparation of tablets using wet granulation or direct compression Optimization of formulation parameters

6. Evaluation of Tablets

Pre-compression parameters: flow properties, angle of repose, bulk and tapped density

Post-compression parameters: hardness, friability, weight variation, disintegration time, drug content uniformity

7. In vitro Antidiabetic Activity

Alpha-amylase and/or alpha-glucosidase inhibition assay to assess antidiabetic potential

8. Stability Studies (Optional)

Short-term stability studies under accelerated conditions

9. Documentation and Report Write

Material and equipment:

Name of material :-

Sr.no.	Name of material
1	Syzgium cumimi (Jamun seed powder)
2	Zingiber officimale ginger
3	Guggula
4	Monk fruit

Fig.1

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Name of chemicals:

Sr. No	Name of chemical
1	MCC
2	Talc

Fig.2

Name of equipment :

Sr. No	Name of equipment
1	Dissolution Apparatus
2	PH meter
3	Weighing Balance
4	Table punching machine
5	Hardness Tester
6	Friability Tester
7	Tablet Thickness Tester
8	Sieve & Sieve shaker machine
9	Disintegration Apparatus

Fig.3

Drug and excipients profile :

JAMUN –

Fig.4

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Synonym: Jambul, Jambolan, Jamblang or jamun. Biological source: It is the fruit of Syzygium cumin tree. Family: Myrtaceae

Botanical Description: The 10ommiphor is native in India, Burma, Ceylon and the Andaman, Islands.

Chemical constituents: Fruit is rich in compounds containing anthocyanins, glycoside ellagic acid, kaenferol and myercertin.

Uses: Anti-inflammatory, Bark and seeds used for diabetes which reduce blood sugar level quickly.

GINGER :

Fig.5

Synonym: Gingerin. Rhizoma zingiberis, Zingibere, Ginger Officinale

Biological source: The ginger is the rhizomes of Zingiber officinale, Roscose and dried in the sun.

Family: Zingiberaceae

Botanical Description: The ginger sre mostly cultivates in India, Japan, Nigeria, Jamaica, West Indies and Africa.

Chemical constituents: The ginger is consist with 1-2% of volatile oil, 5-8% pungent principle, starch and resinous mass.

Uses: Pain relief from rheumatoid arthritis (RA), Diabetes, Migraine headache, Osteoarthritis.

GUGGULA:

Fig.6

Synonym: Guggul, Devadhoop, Kaushika, Indian bdellium tree, scented bdellium.gum gurgul.

Biological source: Oleo gum resins from the bark of 12ommiphora mukul.

Family: Botanical urseraceae

Botanical Description: Guggal is a spiny shrub or small tree with many branches, usually growing two or three meters high, that is native to India, Arabia and Pakistan.

Chemical constituents: Guggulu contains diterpenoids, triterpenoids, steroids, long-chain aliphatic tetrols, aliphatic esters, ferulates, lignans, carbohydrates.

Uses: Modern therapeutic uses of guggul include nervous diseases, leprosy, ulcerative pharyngitis, hypertension and urinary disorders.

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MONK FRUIT–

Fig.7

Synonym: Momordica grosvenorii Swingle and Thladiantha grosvenorii (Swingle) C. Jeffrey
Biological source: Monk fruit is a natural sugar alternative derived from the Siratia grosvenori plant.
Family: Burseraceae
Botanical Description: The cultivation of „monk fruit" brought from China has started in Kullu, Himachal Pradesh.
Chemical constituents: Cucurbitane glycosides, mogrosides, are the main components of the
S. grosvenorii fruit and mogroside V is the main mogroside in the Monk fruit extract.
Uses: Prevent obesity, cancer, diabetes, blood sugar management, sweetener in baverages dressings inflammation & antioxidants.

Methodology:
Phytochemical Screening.
1. Preformulation Study:
• Solubility
• Dissolution
• Bulk density
• Excipients compatibility
• Stability study
• Flow property.

2. Identified preparation method
Direct compression for fast dissolving tablet:
• Blending
• Dry Granulation
• Milling
• Lubrication
• Compression
• Packaging

Procedure for Formulation:
Preparation of Herbal Ingredients:
Take dried Syzygium cumini seeds and Zingiber officinale rhizomes. Powder each ingredient separately using a grinder.
Pass through sieve #80 to obtain fine powder.
Mixing:
Accurately weigh all powdered herbs: S. cumini, Z. officinale, Guggul, and Monk fruit. Mix all powders uniformly in a mortar or blender.

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Add weighed MCC and mix thoroughly.
Finally, add Talc and mix gently to ensure uniform flow properties.
Tablet Compression:
Use the table punching machine to compress the powder blend into tablets. Use 8–10 mm round flat punches.
Adjust machine pressure to obtain tablets of 4–6 kg/cm² hardness.

Fig.8(granules)

Fig.9(polyherbal antidiabetic tablet)

Formulation table of syzygium cumini and gingiber officinale tablet :
formulation table of 500mg antidiabetic polyhebal tablet .

Sr. No	Ingredients	Quantity(mg)
1	Jamun seed powder	200
2	Dried Ginger powder	150
3	MCC	85
4	Monk Fruit	20
5	Guggula powder	15
6	Tale	30

Table.no.4

Evaluation testing parameters :

1) Organoleptic properties :

Organoleptic properties are the sensory qualities of a substance that can be perceived through the senses, such as taste, smell, color, texture, and temperature

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2) Thickness : Thickness is the distance between the top and bottom or front and back surfaces of something. It can also mean the quality or state of being thick. For example, you might describe a plank as measuring two inches in thickness.
3) Hardness : Hardness is a material's resistance to permanent indentation or plastic deformation. It can also be defined as a material's resistance to scratching, abrasion, or cutting.
4) Friability : Friability is the tendency of a solid substance to break into smaller pieces when stressed or rubbed. It can also refer to the tendency of a tablet to chip, crumble, or break.
5) Weight variation : As the name indicates Weight Variation is a defect in which weight differs from the defined ranges given by the official pharmacopoeias.

Result:

Sr.No	Name of Plant	Colour	Odour	Tasste
1	Jamun	Dark purple	Characterstic	Tart and sweet
2	Ginger	Internally pale yellow to brown	Aromatic	Pungent
3	Guggula Powder	Transparent golden to dark brown	Aromatic	Bitter and sweet
4	Monk Fruit	Brown to green	Slightly burnt smell	Sweet

II. CONCLUSION

Preformulation studies of herbal table Containing syzygium cumini , zingiber officinale, monk fruit, guggula and prepared four herbal formulation were studied and showed a satisfactory result in evaluation. From this study, it can confirm that the prepared Herbal tablet formulations are cost effective having less side effect and easily available drugs. So that, our poor Indian. People can afford this type of medicine rather than costly modern medicine.

REFERENCES

1. Khan CR, Shechter Y. Insulin: Oral hypoglycemic agents and the pharmacology of endocrine pancreas, in Goodman and Gillman"s The Pharmacological Basis of therapeutics. 8th ed. New York: Pergaman Press: 1991. P. 1463.
2. Marles RJ, Farnsworth NR. Plant to patients: An ethnomedical approach. Phytomedicine 1995;2:137.aswatha RH, Kaushik U, Lachake P, Shreedhara CS, Pharmacognosy Research 2009;4:224-7.
3. Mukharjee PK. Quality Control of Herbal Drugs. New Delhi: Business Horizons Pharmaceutical Publishers; 2008. P. 186. LP.
4. Unnikrishnan R. Anjana RM, Mohan V. Diabetes mellitus and its complications in India. Nat Rev Endocrinol2016;12(6):357-70. 5.Tomy S, Azeez A, Abdalla FMA, Suresh R, Johnson B. Antidiabetic effect of Polyherbal formulatio “Kathakakhadiradi Kashyam” in Streptozotocin induced Diabetic rats. J Young Pharm 2016;8(4):496-99.
5. Dwivedi C, Daspaul S. Antidiabetic herbal drugs and Polyherbal formulations used for diabetes: A review, J Phytopharmacol 2013;2(3):44-51.1770
6. Antora RA, Salleh RM. Antihyperglycemic effect of Ocimum plants: A short review. Asian Pac J Trop Med2017;7(8):755-59
7. Balammal G, Sekar BM, Reddy JP. Analysis of Herbal Medicines by Modern Chromatographic Techniques. Int J Pre Pharm Res 2012:3(1):50-63.
8. Prabhu TP, Panneerselvam P, Kumar RV, Atlee WC, Subramanian SB. Anti- inflammatory, anti-arthritis andAnalgesic effect of ethanolic extract of whole plant of Merremiae marginata Burm.F. Cent Eur J Exp Biol2012;1(3):94-99.

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9. Patel P. Patel D. Patel N. Experimental investigation of anti-rheumatoid activity of Pleuritic sajor-caju in adjuvant -induced arthritic rats. Chin J Nat Med 2012;10(4):269-74
10. Thillaivanan S, Samraj K. Challenges, constraints and opportunities in Herbal Medicines- A Review. Int J Herb Med 2014;2(1):21-24.
11. Arutselvi R. Balasarvanan T, Ponmurugun P. Saranji NM, Suresh P. Phytochemical screening and comparative study of anti microbial activity of leaves and rhizomes of turmeric varieties. Asian J Plant Sci Res2012;2(2):212-19.
12. Dasaroju S, Gottumukkala KM. Current trends in the research of Emblica officinalis (Amla): A pharmacological perspective. Int J Pharm Sci Rev Res 2014:24(2):150-59.
13. Ved Parkash, Saurabh Maan, Deepika, Shiv Kumar Yadav, Hemlata, and Vikas Jogpal, Fast disintegrating tablets: Opportunity in drug delivery system, 2011 Oct- Dec; 2(4): 223–235.
14. Patricia Van Arnum, Advancing ODT Technology, Pharmaceutical Technology, Pharmaceutical Technology-10-02-2007,Volume 31, Issue 10.
15. Griffin P. Rodgers, M.D., M.A.C.P, National Institute of Diabetes and Digestive and Kidney Diseases
16. (NIDDK),Mayoclinic, diseases-conditions, type-2-diabetes, symptoms-causes, syc- 20351193.
17. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2019. Results. Institute for Health Metrics and Evaluation. 2020.
18. Jamun Syzygium cumini skeels in the Treatment of Diabetes, jagetiagc, Clinical Journal of Diabetes Care and Control ISSN: 2642-0872
19. Rakesh Pahwa and Nisha Gupta*Superdisintegrants in the development of orally disintegrating tabletsNovember 2010International Journal of Pharmaceutical Sciences and Research 2(11) November 20102(11) LicenseCC BY-NC-SA 4.0 27
20. Achhra CV, Pawar HA (2017) Development and Evaluation of Sucrose Free Herbal Orally Disintegrating Tablets of Ginger. J Bioanal,Biomed 9: 288-293. doi:10.4172/1948-593X.1000195
21. Sable Kiran Dattatray2, Mr. Kathwate Ganesh Sunil3,Formulation and Evaluation of Herbal Antidiabetic Tablet,26-04-20
22. T. Sampath Kumar, P. Muthusamy, R. Radha, K. Ilango. Formulation and Evaluation of in vitro antidiabetic Polyherbal tablets form some traditional used herbs. The Journal of Phytopharmacology 2021; 10(3):173-179
23. Vikas Kumar Gupta, Piyush Yadav, Vishal Prajapati, Suraj Maurya, Manish Kumar Maurya, pharmacognosy of ginger officinale, Volume 9, Issue 1 January 2021 | ISSN: 2320-2882