

CAN ALTERNATIVE THERAPIES TREAT DIABETES MELLITUS REVIEW ARTICLE

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Available Online at <http://www.jkcd.edu.pk> DOI:
<https://doi.org/10.33279/2307-3934.2020.0123>

ABSTRACT

Objective: To find out medicinal herbs available that may be used alternative to allopathic medicine for treating type 1 and type 2 diabetes effectively.

Materials and Methods: The information in this article was obtained from the eligible articles retrieved using the search terms diabetes mellitus, medicinal plants, type 1 diabetes and medicinal plants, type 2 diabetes and medicinal plants, and the effect of extract and essential oil of medicinal plants affecting diabetic tissues in the human body. Regarding type-II Diabetes mellitus at least initially, and often throughout their lifetime, these patients do not need insulin treatment to survive. Metformin is oral antidiabetic drug having lesser morbid effects as compared to other oral antidiabetic agents. We have compared hypoglycemic potential of herbal hypoglycemic agent Figs or INJEER with Metformin. It was single blind correlational research conducted at Jinnah Hospital Lahore-Pakistan from April to October 2017. Fifty diabetic type-II patients of were selected for research. Approved and explained consent was taken by all patients. They were divided in two groups, 25 patients in each group. Group-I patients were advised to take 250 mg Metformin thrice daily for two months. Group-II patients were advised to take 10 grams of Injeer (Figs) in three divided doses for two months. Their base line fasting blood glucose level was taken and kept in record. They were advised to visit the OPD of the hospital fortnightly. They were also advised to check their fasting plasma glucose level daily at the morning by using Glucometer (provided by Acon Pharmaceuticals Ltd).

Results: Results were compiled, after 2 months of study and statistically analyzed, it was observed that Metformin decreased blood sugar level 27.6 % and Figs decreased 13.5 %.

Conclusion: It was concluded from the study that Figs can decrease blood glucose level significantly, but when compared to Metformin, this change is about half fraction of the Metformin.

Keywords: hyperglycemia, complications, hyperlipidemia, oxidative stress

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INTRODUCTION

Destruction of beta-cells of the islets of Langerhans in the pancreas, and consequently, the development of insulin-dependent Diabetes is one of the

impairments of the regulation of the immune system. Several environmental and genetic factors affect the immune system, leading to the attack of lymphocytes, especially lymphocytes, and pancreatitis. This inflammatory response may cause insulinitis and Diabetes. There are currently more than 150 million people with Diabetes across the globe, which seems to reach 300 million by 2025. In the absence of proper treatment, cardiac, vascular, neurological, and renal damage and neuropathy may occur. Treatment includes diet, exercise, and medication. Currently, the main and effective treatment for Diabetes is the use of Insulin and hypoglycemic drugs, but these compounds also have many adverse side effects. Medicinal plants have a long history of usage, and today, they are extensively used for various diseases. There are three major types of Diabetes: type 1 diabetes, type 2 diabetes, and gestational diabetes.¹ All types of Diabetes mellitus have something in common. Normally, the body breaks down the sugars and carbohydrates eat into a special sugar called glucose. Glucose fuels the cells in the body. But the cells need Insulin, a hormone, in the bloodstream to take in the glucose and use it for energy. With diabetes mellitus, either body doesn't make enough Insulin, and it can't use the Insulin it does produce or a combination of both.² Since the cells can't take in the glucose, it builds up in the blood. High levels of blood glucose can damage the tiny blood vessels in kidneys, heart, eyes, or nervous system. That's why Diabetes -- especially if left untreated -- can eventually cause heart disease, stroke, kidney disease, blindness, and nerve damage to nerves in the feet.³ Currently, six classes of oral antidiabetic drugs (OADs) are available: biguanides (e.g., metformin), sulfonylureas (e.g., gliclazide), meglitinides (e.g., repaglinide), thiazolidinediones (e.g., pioglitazone), dipeptidyl peptidase IV inhibitors (e.g., sitagliptin), and α -glucosidase inhibitors (e.g., acarbose).⁴ Metformin marketed under the trade name Glucophage among others, is the first-line medication for the treatment of type 2 diabetes. This is particularly true in people who are overweight. It is also used in the treatment of polycystic ovary syndrome. Limited evidence suggests Metformin may prevent cardiovascular disease and cancer complications of Diabetes. It is not associated with weight gain. It is taken by mouth.⁵ Metformin is generally well tolerated. Metformin is in the biguanide class. It works by decreasing glucose production by the liver and

increasing glucose use by body tissues.⁶⁻⁹ Fig is a tree. The fruit is commonly eaten. The fruit and leaves are used to make medicine.¹⁰ Raw figs are a good source (14% of the Daily Value, DV) of dietary fiber per 100-gram serving (74 calories), but otherwise do not supply essential nutrients in significant content. In a 100 gram serving providing 229 calories, dried figs are a rich source (> 20% DV) of dietary fiber and the essential mineral, manganese (26% DV), while several other dietary minerals are in moderate-to-low content.¹¹ Figs contain diverse phytochemicals, including polyphenols such as gallic acid, chlorogenic acid, syringic acid, (+)-catechin, (-)-epicatechin, and rutin. Fig color may vary between cultivars due to various concentrations of anthocyanins, with cyanidin-3-O-rutinoside having particularly high content. Many plants from different parts of the world have been investigated for antidiabetic effects. This review article reported some of the most important medicinal plants with hypoglycemic properties according to reliable clinical and laboratory evidence. Also, it touched on the medicinal plants that are prescribed, in Iranian traditional medicine, for the treatment of diabetes.¹²⁻¹³

MATERIALS AND METHODS

The design of research work was correlational and was conducted at Jinnah Hospital, Lahore, from April to October 2017. Fifty diabetic patients (Diabetes Mellitus type-II) were selected from the Jinnah hospital to conduct a research study. Inclusion criteria were age limit from 25 to 70 years of both gender, male and female whose hyperglycemia was controlled and moderated in the state. We excluded those diabetic patients whose hyperglycemia was uncontrolled, unstable, fragile due to the use of allopathic or herbal hypoglycemic agents. Patients were divided into two groups. Group-I (25 diabetic patients) was advised to take 250 mg of Tablet Glucophage 250 mg (Metformin) half an hour before taking a meal, thrice daily for two months. Group-II patients (25 diabetic patients) were advised to take Injeer (Figs) 10 grams daily in three divided doses half an hour after each meal for two months. Their baseline fasting glucose level was determined by Glucometer (On-Call Extra made by ACON Lab 1190059) at the start of research work. They were advised to check and keep in the record their fasting blood glucose level every day early in the morning. They were advised to take their normal meal without

Table: 1 Explaining before and after treatment values, percentage change and statistical significance of diabetic patients with two different drugs

Drug group	At day-0	At day-60	change	% change	p-value
Group-I (Metformin) n=23	230.04±1.99	166.66±2.05	63.4	27.6	<0.001
Group-II (Figs) n=25	219.22±1.67	189.67±1.04	29.5	13.5	<0.01

any supplement or high glucose-contained baked or high glucose-containing natural fruits. They were advised to come to the hospital for follow up or any query regarding drug compliance. Data were expressed as the mean \pm SD, and the “t” test was applied to determine statistical significance as the difference. A probability value of <0.01 was considered significant, and $P<0.001$ was considered highly significant.

RESULTS

Results of treatment with two different drugs on fasting blood glucose of DM-II patients are shown in the following table:

DISCUSSION

For Diabetes in the absence of proper treatment, cardiac, vascular, neurological, and renal damage and neuropathy may occur. Treatment includes diet, exercise, and medication. Currently, the main and effective treatment for Diabetes is the use of Insulin and hypoglycemic drugs, but these compounds also have many adverse side effects. Medicinal plants have a long history of usage, and today, they are extensively used for various diseases. Allopathic medications are just for good survival of the patients victimized by diabetes mellitus. These drugs have adverse effects, which can lead to less compliance of patients. Nowadays, herbal medications are going to replace allopathic drugs due to their ethnic related doctrine and having lesser adverse effects. In our research, Metformin decreased fasting blood glucose 63.4 mg/dl in two months of therapy, which is equal to a 27.6 % decrease. Biostatistically, this change in mean values is highly significant, which matches with results of the study conducted by Hubbard JK et al¹⁴ who proved almost the same effects of Metformin on fasting blood sugar levels in 103 diabetic patients suffering from Diabetes Mellitus type-II. Dunn CJ et al¹⁵ described that Metformin interrupts carbohydrates absorption from the gastrointestinal tract. Our results are in contrast with the results of the study conducted by Spiller HA et al¹⁶ who observed and proved only 24.8 mg/dl reduction in 22 diabetic

male patients when Metformin was used at a dose of 250 mg twice daily for three weeks. This contrast in results may be due to less concentration of drug used.

Hundal RS et al¹⁷ agree with the already accepted theory of Metformin’s hypoglycemic mechanism that inhibition of hepatic gluconeogenesis is the main cause for blood glucose level reduction. Triggler CR et al¹⁸ labeled Metformin drug as the first choice hypoglycemic agent in type-II diabetic patients. In our research results, Figs or Injeer decreased fasting blood sugar about 29.5 mg/dl in two months therapy in 25 diabetic patients of Type-II, which is a statistically significant decrease in the parameter. These results match with results of a study conducted by Mawa S et al¹⁹ who proved that about 30.87 mg/dl of blood glucose might be decreased when Figs are used for three months with regular intake of this fruit with each meal, i.e., thrice daily. C Perez et al²⁰ proved almost the same changes in fasting blood glucose in 117 diabetic patients suffering from Type-II DM. Perez C et al²¹ wrote that these fruits could lower fasting sugar levels even more than this reduction proved if used in enough amount and research controlled environment. Our results do not match with results of research work conducted by Serraclara A et al²² who proved a very small amount of blood glucose reduction in 12 patients suffering from DM type-II, even they used 500 mg of Metformin thrice daily for one month.

Contrast in these results are or may be due to lesser exposure of drug and small sample size. Lyme WE et al²³ warned in their research work’s conclusion that Metformin can cause morbid effects if given concurrently with Insulin. He has encouraged to use Metformin with Figs without any fear of morbid hypoglycemia. Farzana K et al²⁴ explained that various drug combination, especially allopathic agent and medicinal plants could cause synergetic effects, so must be used with dose titration. Lujha MN et al²⁵, Sarmanv J et al²⁶, and Khurshid M et al²⁷ have emphasized on meta-analytic research on pharmacognosy and medicinal plants to get right and full therapeutic usefulness from these compounds.

Diabetes mellitus is the most common chronic and metabolic disease characterized by an increase in glucose levels due to absolute or relative insulin deficiency. The disease is associated with eye, renal, cardiovascular, and neurological complications in the long term. This disease is also associated with symptoms such as polyuria, fatigue, weight loss, delayed wound healing, blurred vision, increases in urine glucose levels.²⁸⁻³²

REFERENCES

- de Amorin A, Borba HR, Carauta JP, et al. Anthelmintic activity of the latex of *Ficus* species. *J Ethnopharmacol* 2009;64(3):255-8.
- Kostapanos, MS, Liamis GL, Milionis HJ, Elisaf, MS. Do statins beneficially or adversely affect glucose homeostasis? *Curr Vasc Pharmacol*. 2010;8:612-631.
- Lacher M, Hermanns-Clausen M, Haeflner K, Brandis M, Pohl M. Severe metformin intoxication with lactic acidosis in an adolescent. *Eur J Pediatr*. 2005;164(6):362-5.
- The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus: Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care* 2010;20: 1183-1197.
- Lipska KJ, Bailey CJ, Inzucchi SE. "Use of metformin in the setting of mild-to-moderate renal insufficiency" *Diabetes Care* 2011;34(6):1431-7.
- Carpenter MW, Coustan DR: Criteria for screening tests for gestational Diabetes. *Am J Obstet Gynecol* 2011;144: 768-73.
- Canal JR, Torres MD, Romero A, Perez C. A chloroform extract obtained from a decoction of *Ficus carica* leaves improves the cholesterolaemic status of rats with streptozotocin-induced Diabetes. *Acta Physiol Hung* 2010;87(1):71-6.
- Liu A, Coleman SP (2009). "Determination of metformin in human plasma using hydrophilic interaction liquid chromatography-tandem mass spectrometry." *J. Chrom.* 2009; B-877(29): 3695-3700.
- N. A. Zeggwagh, A. Moufid, A. Khaldi, J. B. Michel, and M. Eddouks. Cardiovascular effects of *Nigella sativa* aqueous extract. *Circulation* 2010; 6 (8):343-6.
- Dell'Aglio DM, Perino LJ, Kazzi Z, Abramson J, Schwartz MD, Morgan BW. Acute metformin overdose: examining serum pH, lactate level, and metformin concentrations in survivors versus nonsurvivors: a systematic review of the literature. *Ann Emerg Med*. 2009;54(6):818-23.
- Fantus IG, Brosseau R. Mechanism of action of Metformin: insulin receptor and post-receptor effects in vitro and in vivo. *J Clin Endocrinol Metab*. 2009;63(4):898-905.
- Perez C, Canal JR, Campillo JE, et al. Hypotriglyceridaemic activity of *Ficus carica* leaves in experimental hypertriglyceridaemic rats. *Phytother Res* 2008;13(3):188-91.
- Rubnov S, Kashman Y, Rabinowitz R, et al. Suppressors of cancer cell proliferation from fig (*Ficus carica*) resin: isolation and structure elucidation. *J Nat Prod* 2010;64(7):993-6.
- Hubbard JK, Soman JT, Firka LU. Type 2 diabetes and Metformin. First choice for monotherapy: weak evidence of efficacy but well-known and acceptable adverse effects." *Prescrire international* 2014;23(154): 269-72.
- Dunn CJ, Mokar TY, Peters DH. "Metformin. A review of its pharmacological properties and therapeutic use in non-insulin-dependent diabetes mellitus". *Drugs* 2007;49 (5): 721-49.
- Spiller HA, Weber JA, Winter ML, Klein-Schwartz W, Hofman M, Gorman SE, Stork CM, Krenzelo EP. Multicenter case series of pediatric metformin ingestion. *Ann Pharmacother*. December 2010;34(12):1385-8.
- Hundal RS, Mekun HY, Inzucchi SE. "Metformin: new understandings, new uses". *Drugs* 2008;63(18):1879-94.
- Triggle CR, Peten TR, Tungju MR, Ding, H. "Metformin is not just an antihyperglycaemic drug but also has protective effects on the vascular endothelium." *Acta physiologica* 2015;115(4):227-9.
- Mawa S, Husain K, Jantan I. Phytochemistry of Fig: Traditional Uses and Biological Activities. *Evid Based Complement Alternat Med*. 2013;14(7):4256-9.
- C Perez, E Domingues, MD Torres. Hypoglycemic activity of an aqueous extract from Fig tree leaves in diabetic patients. *Pharmaceutical Biology* 2009;38(3):181-6.
- Perez C, Mahul K, Insur T, Dunminku Y, et al.; A study on the glycaemic balance in diabetic patients treated with an aqueous extract of *Ficus carica* (fig tree) leaves. *Phytotherapy Research* 2009;20 (1): 82-83.
- Serraclara A, Hawkins F, Perez C, et al. Hypoglycemic action of an oral fig-leaf decoction in type-I diabetic patients. *Diabetes Res Clin Pract* 2009;39(1):19-22.
- Lyme WE, Sen YS, Paralu YT. Hypoglycemic action of an oral fig-leaf in type-II diabetic patients. *Diabetes Research and Clinical Practice* 2008;39(1):1200-1211.
- Farzana K, Rukhsar M, Farhan K, Barkat S, Bilawal L. New ways to treat health problems. *Allo VS Alt Med* 2016;3(2):66-9.
- Lujha MN, Sarmanv BY, Fernhinn LL, Jololl TR. *World of Herbs* 2014;10(3):375-9.
- Sarmanv J, Helnev U, Erikjv C, Soothmj B. Plants, and therapeutics. *J Med Bot* 2012;3(1):333-8.
- Khursheed M, Malook A, Barkat S. Effects of plants on

- health. *Medicinal Botany* 2014;4(2):88-92.
28. Luija E, Yulsee C, Mawa S, Husain K, Jantan I. Phytochemistry of Fig: Traditional Uses and Biological Activities. *JMHR* 2016;22(1):90-5.
 29. Mahul K, Insur T, Dunminku Y, C Perez, E Domingues, D Torres. Hypoglycemic activity of an aqueous extract from Fig tree leaves in diabetic patients. *Pharmaceutical Biology* 2013;18(3):112-6.
 30. Sarmanv BY, Fernhinn LL Perez AC, Mahul IK, Insur TI, Dunminku YM, et al.; A study on the glycaemic balance in diabetic patients treated with an aqueous extract of *Ficus carica* (fig tree) leaves. *Phytotherapy Research* 2017;23(8):12-7.
 31. Rukhsar M, Farhan K, Barkat S, Serraclara A, Hawkins F, Perez C, et al. Hypoglycemic action of an oral fig-leaf decoction in type-I diabetic patients. *Jou Med Herbs* 2010;13(5):223-7.
 32. Lyme WE, Sen YS, Rukhsar M, Farhan K, Barkat S Paralu YT. Hypoglycemic action of an oral fig-leaf in type-II diabetic patients. *JHMCR* 2017;111(5):67-73.