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Research Article

A Comparison of Chemical Compounds between Anti-Diabetic Drug and Some Medicinal Plants

Ali J. Muhialdin[1], Zhala B. Taha[2], Rahman K. Faraj[3], Ali M. Hussein[4], Rayan S. Salahalddin[4], Hawri A. Majeed[4]

[1]Department of Animal Production, College of Agricultural Engineering Sciences, University of Garmian, Kalar, Kurdistan Region, Iraq, [2]Department of Forestry, College of Agricultural Engineering Sciences, Salahaddin University, Erbil, Kurdistan, Iraq, [3]Department of Chemistry, College of Science, University of Garmian, Kalar, Kurdistan Region, Iraq, [4]Department of Biomedical Sciences, Cihan University-Erbil, Kurdistan Region, Iraq

ABSTRACT

Type 2 diabetes (T2D) is a kind of diabetes marked by high blood sugar, insulin, and insulin insufficiency. Adult-onset diabetes is another name for it. Increased thirst, frequent urination, and unexplained weight loss are common indications and symptoms. Metformin side effects include metallic taste, weakness, diarrhea, stomach upset, lactic acidosis, and vomiting. Two other side effects are asthenia and a Vitamin B12 deficiency. Many recent studies and most health experts recommend basil seed as a better Metformin substitute. The research investigates why patients who consume basil seeds have a similar response to those who take Metformin. The methodology of the study consisted of two main steps, first step is to analyze basil and use HPLC to determine its chemical components. The second step is to compare the broken-down components to Metformin-composed materials, which is done by diluting with methanol/water (50:50 v/v) and removing the fat layer using 20 mL hexane. The findings showed that basil seed and Metformin had the most similar component structure, thus the foundlings concluded that patients had the same responses without the Metformin side effects, implying that basil seed stabilizes blood sugar levels.

Keywords: *Ocimum basilicum*, *Trigonella foenum-graecum*, metformin, chemical composition, type 2 diabetes

INTRODUCTION

One of the most common metabolic disorders is diabetes mellitus. It is characterized by hyperglycemia caused by absolute or relative insulin deficiency, and it is related to long-period issues with the heart, nerves, kidneys, and eyes.[1] Insulin-dependent diabetes mellitus (IDDM, Type 1) and non-insulin-dependent diabetes mellitus (NIDM, Type 2) are the two types of diabetes mellitus.

The localized inflammatory reaction in the pancreas and its surrounding areas marked Type 1 diabetes which is an autoimmune disease.[2]

Characteristics of Type 2 diabetes are peripheral insulin resistance and insulin efficiency. Insulin-independent sugar diabetes is substantially more common than insulin-dependent sugar diabetes among the two kinds of diabetes. In non-insulin-dependent diabetic mellitus, sulphonylureas and a few biguanides are efficient therapies for hyperglycemia, but they are unable to reestablish glucose homeostasis and normalize glucose levels.[3] The pharmacokinetic features, subsequent failure rates, and side effects of these medicines limit their use. Even insulin therapy does not guarantee a long-term return to normal glucose homeostasis, and it is linked to a higher risk of cancer.[4]

The advantage of medicinal plants is that they have no or few adverse effects. Some of them have been utilized in traditional medical systems for 100s of years in a variety of places around the world. Metformin, a drug produced from the medicinal plant Galego officinalis was once used in medieval Europe to treat diabetes and is still the only medical treatment that is moral for NIDDM patients. There is a variety of anti-diabetic plants that could be useful in the creation of medications for the treatment of sugar diabetes. An excellent source of protein in the diet for both humans and animals is Fenugreek (*Trigonella foenum-graecum* L.). Fenugreek seeds

Corresponding Author:
Ali M. Hussein, Department of Biomedical Sciences, Cihan University-Erbil, Kurdistan Region, Iraq.
E-mail: ali.m.hussein@cihanuniversity.edu.iq

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and leaves are used to manufacture medicinal extracts and powders.[5]

According to reports, it has an anti-diabetic, anti-parasitic, anti-microbial, anti-infertility, anti-cancer, and hypocholesterolemic agent. It also has a lot of minerals and vitamins in it.[6] Basil (*Ocimum basilicum* L.), commonly referred to as Sweet or Garden Basil, is widely grown in the Mediterranean region.[7] Diuretic, antipyretic, antispasmodic, and stomachic properties are all found in basil seeds.[8] According to various research, including medicinal and aromatic plants (MAP) in broiler diets resulted in, an increase in body weight, the efficiency of feed conversion, and feed cost.[9]

The project's goal is to demonstrate the chemical composition of Basil and Fenugreek seeds and compare it to Metformin components to clarify the rationale for utilizing the seeds as a Metformin substitute, which will be accomplished by completing the following objectives.

MATERIALS AND METHODS

Chemicals and Reagents

Metformin HCl (MH) powder, Fenugreek seeds powder, Basil seeds powder, 0.1% phosphoric acid, acetonitrile, methanol/water, Hexane were used as reagents for the whole procedure.

Devices and Instrumentation

The separation was carried out using a Shimadzu 10AV-LC liquid chromatography system with the use of binary delivery pump model LC-10A Shimadzu, and the eluted peaks were kept track of using a UV–Vis 10 A– SPD Spectrophotometer [Figure 2]. "Chromatography is a physical separation method in which the components to be separated are split into two phases, one of which is stationary and the other of which moves in a specified direction." The stationary phase is a solid, porous, and surface active substance in small particle form or a liquid deposited onto microparticulate beads on an inert solid substrate in HPLC (usually silica). The mobile phase in the column is a liquid that moves across a packed bed of solid surface under pressure.[10]

Chromatographic Conditions

Metformin was isolated on an FLC (fast liquid chromatography) column under optimal circumstances. Particle size 3 m, Phenomenex C-18 column (50 2.0 mm I.D). Stage of mobility: In Solvent B, use 30, 70 v/v acetonitrile; in solvent A, use 0.1% phosphoric acid. UV 232 nm detection at 1.0 ml/min flow rate.[11]

Preparation of Stock Solution

Standard solution preparation; from the stock solution, samples of different concentration of Metformin reference were produced, which was created by precisely weighing about 10 mg Metformin and transferring it to a 100 ml volumetric flask, then adding methanol/water (50:50 v/v) as a diluent, shaking the sample well in an ultrasonic bath and adding diluents to bring the volume up to the desired level. This was then filtered using a membrane filter with a 0.45-mm pore size.[12]

Extraction of *Ocimum basilicum* and *Trigonella foenum-graecum*

0.5 g of sample powder was dissolved in 20 ml hexane to remove the lipid bilayer, then the aqueous layer was melted in 100 ml of 80:20 solutions (methanol: water). The distillate was supersonic at 60% duty cycles for (duty revolution for) 20 min at 25°C, followed by centrifugation at 7500 rpm for 15 min (Branson conifer, USA). Before evaporation under vacuum, each sample's clear supernatant was treated with charcoal to eliminate colors (Buchi Rotavapor Re Type).[13]

Chemical Evaluation for Samples

Dried samples were resuspended in 1.0 ml HPLC grade methanol by overtaxing. The mixture was poured through a 2.5 um disposable filter and stored for subsequent analysis at 4°C. According to optimum conditions, 20 ul of the sample was injected into the HPLC system.

RESULTS AND DISCUSSION

The figure 1 shows the standard composition of Metformin analysis by HPLC, the retention time for finding the chemical was 3.688 with an area 297141v and the concentration was 65.8425%. The round was stopped at 6.443. A previous study showed a similar retention time, which explains over the concentration range of 0.312–5 g/mL, the technique was linear (R2 = 0.9995). Metformin had a detection limit of 0.1 g/mL and a quantitation limit of 0.3 g/mL. In the case of pharmaceutical formulations, the acquired findings revealed a good agreement with the claimed ingredients.[14]

The figure 2 shows the standard composition of Basil seed analysis by HPLC, at the first peak, the retention time for

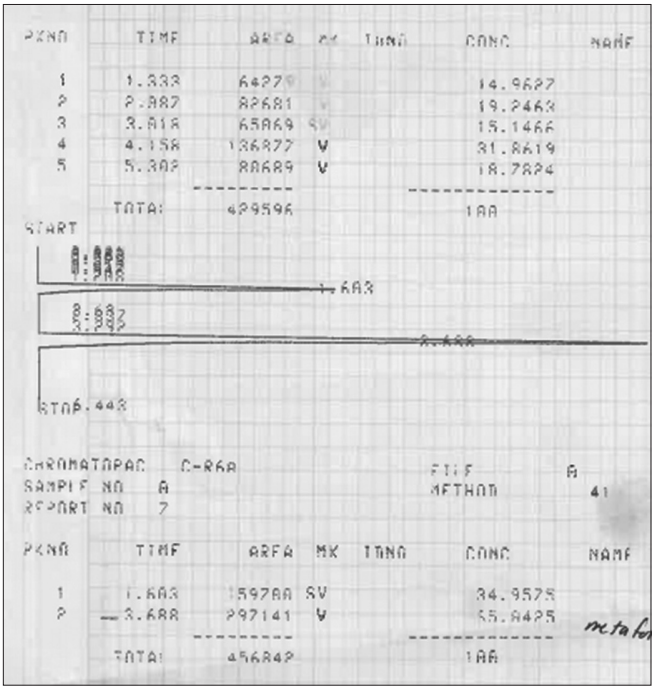

Figure 1: Metformin standard composition

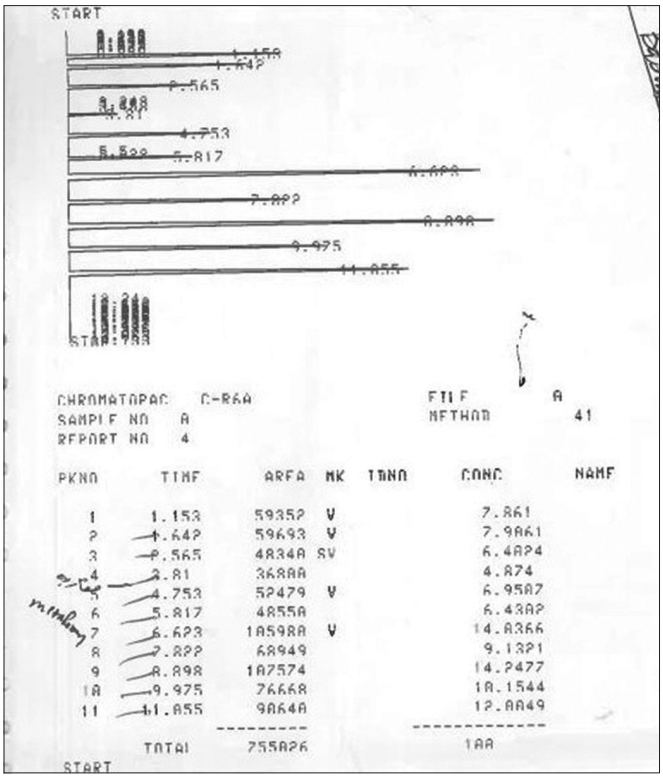

Figure 2: The composition of basil seeds

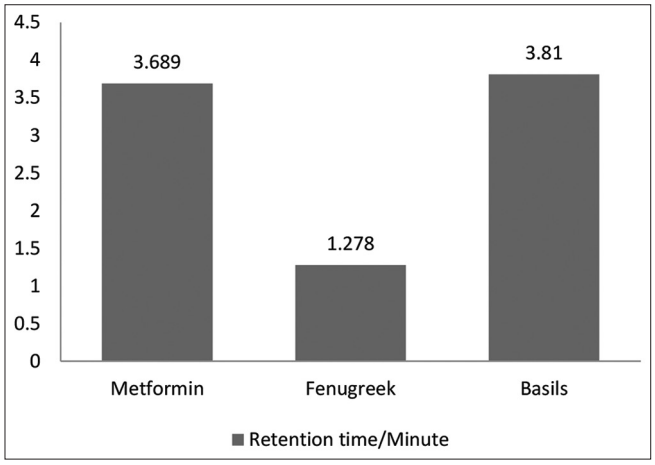

Figure 3: Retention time of used extracts

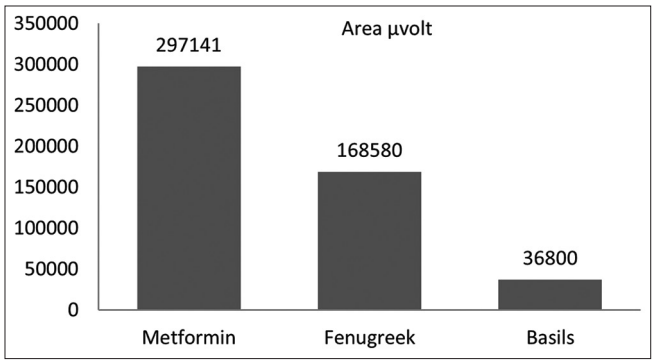

Figure 4: Peak area of used extracts

finding the chemical was 1.153 with an area 59352v and the concentration was 7.868%. At the second peak, the retention time for finding the chemical was 1.642 with an area 59693v and the concentration was 7.9861%. At the third peak, the retention time for finding the chemical was 2.565 with area 48340v and the concentration was 6.4024%. However, at the fourth peak, at the time 3.81 with an area 36880v 4.874% was the most similar chemical with Metformin composition. Prior research found that OAP-1A was a neutral heteropolysaccharide consisting of mannose (35.7%), glucose (33.32%), galactose (19.6%), and rhamnose (11.38%) which is similar with the same chemical composition of Basil seeds result.[15]

The figure 3 shows the standard composition of Fenugreeks analysis by HPLC, the retention time for finding the chemical was 1.948 with an area 218757v and the concentration 15.8732%. At the second peak, the retention time for finding the chemical was 3.15 with area 636125v and the concentration was 46.158%.

At the third peak, the retention time for finding the chemical was 3.983 with area 354686v and the concentration was 25.7364%. The study provides an alternative natural strategy to treat diabetes, and we began formulating and testing these claims based on earlier studies and claims that referred to basil seeds as a drug and other studies that referred to fenugreek seeds as a medication.

Our data and analysis reveal that eating basil seeds as a drug will help reduce or lower blood sugar levels by a retention time of 3.81/min, indicating that it is more compatible with Metformin hydrochloride, according to the study. As shown in figure 4, our findings confirmed the previous studies and researches that basil seeds are effective in treating diabetes; our study confirms those findings and adds to the evidence that basil seeds are a great alternative to metformin with few to no side effects.

However, our findings suggest that fenugreek seeds are not as effective as other researchers suggest, which may call into question theories and studies that have been conducted. However, we acknowledge our limits and welcome discussion because we do not feel that our research is the ultimate and final solution, and that more and more studies in this sector, that is, comparing chemically manufactured medications to natural resources, are required.

CONCLUSION

Depending on the previous data and figures, each *Ocimum basilicum*, *Trigonella foenum-graecum* which are known as medicinally used seeds have the same chemical as Metformin pills with is the official treatment used for optimizing the sugar amount in the blood, the future study will be a clinical trial which is procedure approved by FDA for finding new treatment or drugs.

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