

Incorporation of Suitable Nutrition in the Management of Diabetes: A Case Study

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Received: 18 Aug 2026; Accepted: 20 Sep 2026; Published: 03 Oct 2026

Citation: Asiko A Grace, Ngare M Stanley. Incorporation of Suitable Nutrition in the Management of Diabetes: A Case Study. Food Sci Nutr Res. 2026; 9(4): 1-5.

ABSTRACT

Diabetes upsurge is closely linked to climate change due to environmental degradation, negatively impacting on agricultural production. Related lifestyle diseases include Hypertension and cancer. Diabetes is a pandemic, with huge economic burden, affecting close to 2.3 million people in Kenya, with 50% undiagnosed. In children, 55% are either mis-diagnosed or underdiagnosed. Most Diabetic cases (90%) are of type2. The good news is that type2 Diabetes could be reversed, with proper management involving ardent monitoring for blood sugar, appropriate and healthy nutrition, exercise and lifestyle change. Challenges include: Lipid cholesterol risk, glycemic control, care and affordability of treatment. There is dire need for greater awareness and prevention efforts. Delving into this, a case study was conducted on a volunteer diabetic individual for blood sugar monitoring after the initial insulin injection. Limited precision drugs were prescribed accordingly and a rich mixed diet, as per the World Diet classification, consisting of fruits and vegetables, introduced, in addition to exercise. Results from routine Monitoring for blood sugar stability, on a diabetic individual, incorporating mixed nutritious diets (Mediterranean, Indian and Kenyan) with exercise, showed reduction from high blood glucose reading of 7.6 to 5.2 mg/dL. The acceptable range of sugar in the blood is 4-7 mg/dL. The greatest positive impact from fruits and vegetables was achieved with the consumption of: Cucumber, *Cucumis sativa* Linneaus; Okra, *Abelmoschus esculentus*; Jew's mallow, *Corchorus olitorius* Linneaus and *Crotalaria*, *Crotalaria brevidens*, separately or in combination, in the lowering of blood sugar level. The inclusion of honey, specifically the stingless bee honey, had an additive benefit as a lower glycemic index (GI) product, producing a steady rise in blood glucose instead of a spike, hence able to manage Diabetes type2. Honey and other hive products, contribute tremendously to food security, nutrition and improved health, by complementing conventional medicine through Api-therapy. Medicinal herbs exhibit great potential, singly or in combination, to drug development to treat or manage: Diabetes, cancer and hypertension. This concurs with other researchers, working on Coriander, *Coriandrum sativum* and Rosemary, *Murraya koenigii*, for cancer cure.

Keywords

Diabetes mellitus, Type 2 diabetes, Climate change, Environmental degradation, Blood glucose monitoring, Glycemic control, Healthy nutrition.

Introduction

Globally, 589 million people have Diabetes out of which 25 million are from Africa Region, with 5.9 in 1000 people. Diabetes thus remains a global health crisis, with prevalence rates continuing to rise [1]. Diabetes is a pandemic, with huge economic burden,

affecting close to 2.3 million people in Kenya, with 50% undiagnosed. In children, 55% are either mis-diagnosed or underdiagnosed. Most Diabetic cases (90%) are of type2 [2]. The recent National Survey in Kenya in the year 2025, show high prevalence in low-income urban areas within Nairobi, with a range of 4.1%-5.3%. Diabetes is Systemic, as observed by the American Diabetes Association, 1994 hence require Systemic approach in its treatment and management. Multi-disciplinary approach: Insulin injection, drugs, exercise, nutrition, should be employed, on complementary basis, Powers, 1996 in addition to a peaceful environment,

Spending time in Green spaces has been shown to reduce the risk of Diabetes, heart disease and High blood pressure [3].

Health, food and nutrition, are intertwined. Globally, close to 3.1 billion people cannot afford healthy diets, FAO, 2022. Having food to eat is fundamental but having access to the right food is just as crucial, IFAD, 2022 [4].

There is growing evidence indicating that type2 Diabetes could be reversed, with proper management, involving ardent monitoring for blood sugar, appropriate and healthy nutrition, exercise and lifestyle change [5].

Why the study?

Increasing number of Diabetic patients in Kenya
Economic burden to affected families due to Diabetes
Limited awareness
Arising complications if un-treated
Possible preventive measures

Methodological Approach

A case study was done on a volunteer diabetic individual for blood sugar monitoring: Age bracket (60-65 years), weight reduction was prioritized (68-62 kg). Results from other patients could not be incorporated due to ethical consideration.

Blood sugar monitoring

Blood sugar monitoring was done using capillary blood glucose testing, with finger sticking device and lancet-Medisign mm 1200-Self calibration (Figures 1 and 2), giving an estimate of blood glucose level increment in Mg/dL. This was done after the initial insulin injection was administered for two weeks. Limited precision drugs: Metformin, Glucophage, Galvonet and other, were prescribed accordingly and a rich mixed diet, as per the World Diet classification, consisting of cereals, fruits and vegetables introduced, in addition to exercise, mainly walking, limb movements and squatting (Guided by Social media: Television, internet and facebook, Figure 3). The choice of exercise was influenced by the physical fitness of the patient.

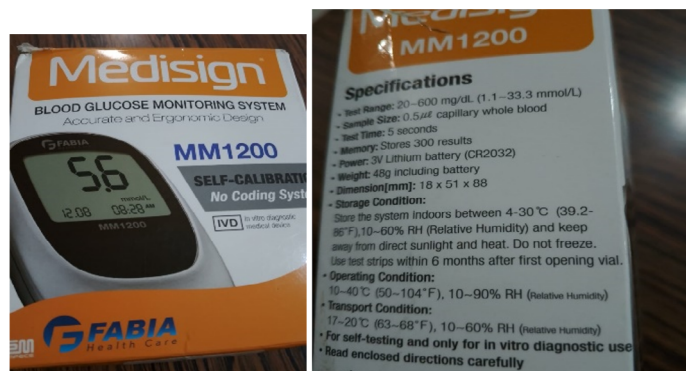


Figure 1a,b: Medisign MM 1200-Blood Glucose Monitoring System.

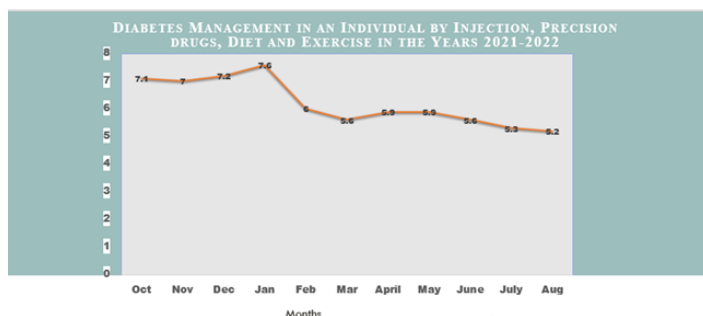


Figure 2: Progressive Monitoring of Glucose/Blood Level of a Diebetic.



Figure 3: Military Workout-helps Reduce Blood Glucose (HIIT).

Diet

Diet was selected based on World Diets, by russel- Mixed Mediterranean, Indian and Local Kenyan Diets): Fist-size whole carbohydrate meal (brown ugali/brown rice), ¼ plate vegetables, ¼ plate protein (white meat/fish), Avocado/olive oil/nuts, broccoli, cabbage, Coriander, Rosemary, honey (particularly stingless bee honey (The plate concept).

Vegetables

Vegetables were selected from an array of the recommended available leafy vegetables and other (American Diabetes Association-ADA). Kenyan choice: Okra, *Abelmonchus esculentus*, Cucumber, *Cucumis sativa* Linneaus, Jew's mallow, *Corchorus olitorius* Linneaus, *Crotolaria*, *Crotolaria brevides*, Spider plant, *Gynandropsis gynandra*, Night shade, *Solanum nigrum*, *Amaranthus*, *Amaranthus spp*, Spinach, *Spinach oleracea* and cow peas, *Vigna unguiculata* (Linneaus) Walp.

Results

Monitoring for blood sugar

Results from routine Monitoring for blood sugar stability, on a diabetic individual, incorporating mixed nutritious diets

(Mediterranean, Indian, Kenyan local) and exercise, showed positive results within a period of six months and up to one year, minus further medication so long as strict diet and exercise were observed. Results showed reduction from high blood glucose reading of 7.6 to 5.2 mg/dL. The acceptable range of sugar in the blood is 4.0-7.0 mg/dL as per the World Health Organization, 2022. This amounted to reversal of type2 Diabetes within 6 months, as earlier reported by the Kenya Diabetes Study Group, 2023 [1,2].

Diet

The all-encompassing mixed Diet, including honey and fruits (Apples, Avocado, Pawpaw, Oranges, Thorn melon and any other available and in season), were assessed based on their proven history and individual fruit preference. The Media had great influence in choice of fruits and vegetables through intensive awareness on fruit/vegetable value and ability to cure specific ailments. Apples were advocated for keeping the Doctor away, Avocado for “good” fat, Thorn melon for lowering blood pressure and stingless bee honey for having a lower Glycaemic Index (GI) to manage blood sugar spikes as approved by Australian and New Zealand Food Standards Authority, 2024 for stingless bee honey to be labelled, “Healthy sugar source,” Mcclure, 2024 [6].

Vegetables

The greatest positive impact from fruits and vegetables was achieved with the consumption of: Cucumber, *Cucumis sativa* Linnaeus; Okra, *Abelmoschus esculentus*; Jew’s mallow, *Corchorus olitorius* Linnaeus and Crotolaria, *Crotolaria brevipes*, separately or in combination, in the lowering of blood sugar level. The inclusion of honey, specifically the stingless bee honey, had an additive benefit as a lower glycaemic index (GI) product. Honey and other hive products, contribute tremendously to food security, nutrition and improved health, by complementing conventional medicine through Api-Nutri-Therapy. Medicinal herbs exhibit great potential, singly or in combination, to drug development to treat or manage: Diabetes, cancer and hypertension. This concurs with other researchers, working on Coriander, *Coriandrum sativum* and Rosemary, *Murraya koenigii*, for cancer cure, Zohra et al.

Discussion

Monitoring

Diabetes patients die prematurely as a result of Hyperglycemia, Hypoglycemia or other complications due to limited awareness. Self-monitoring proved effective despite the discomfort in finger piercing. The Capillary Blood Glucose test was simple and accurate, with disposable needles and lancets limiting possible infection and blood contamination, though adhering to the test schedule was a challenge together with the sudden phasing out of the monitor model used.

The purpose of Monitoring patients with Diabetes is to identify treatment needs, evaluate the effectiveness of treatment and help patients to avoid extremes in blood glucose levels as earlier discussed by Judith et.al.,1996. The acceptable range of sugar in the blood is 4-7 mg/dL (WHO, Diabetes talk, facebook, 2025). The American Diabetes Association recommended balancing food

intake with exercise and medical management, to achieve a near normal blood glucose as possible and optimal serum lipid levels, which are major threats to Diabetic patients.

Type2 Diabetes is a systemic disease, hence requires systemic treatment approach. It should be comprehensive and should be done only with drugs that, in addition to lowering the sugar levels ensure the safety of the rest of the body. Despite the availability of pharmaceutical drugs against type2 Diabetes, there is still an increasing number of secondary complications associated hence the need to explore natural plants and dietary compounds with antioxidant and hyperglycaemic properties such as Okra, strawberry, Jew’s mallow, Crotolaria and Cucumber.

Diabetes Multi-disciplinary approaches

Injection

Drugs

Exercise

Nutrition

Peaceful environment

Best drugs for Diabetes

Insulin- long and rapid acting

Metformin (Biguanide class)

Glipizide (Sulfonylurea class)

Invokana (Sodium glucose cotransporter2-Inhibitor class)

Jardiance (SGLT2 class)

Januvia (dipeptidyl peptidase4 Inhibitor)

Metformin is often the 1st medicine prescribed for type2 Diabetes. It lowers the amount of glucose the liver produces and helps in insulin utilization by the body [1].

Diet

Mixed Diets are essential as per the availability and nutritional requirement, though Mediterranean Diet is recommended. The local Kenyan mixed Diet was best, with therapeutic traditional vegetables and whole brown grains, which sufficed. Fruits were selected according to availability and proven therapeutic value, Appendices 11, 111, 1V.

The dietician

is a crucial member of the Diabetes health team whose expertise helps shape the Diabetes treatment plan. There is increased emphasis on individual nutrition therapy under the DCCT Approach to Diabetes care. The perceived Triad of Diabetes Management (Food, Insulin and Activity) works best with: Healthy food choices, eating behaviour and exercise habits, as observed by American Diabetes Association, 1994.

Diabetes is a pandemic and systemic, requiring systemic approach in its treatment. Multi-disciplinary approach: injection, drugs, exercise (walking for 15-30 minutes lowers blood sugar, Green thumb-Facebook, Squatting lowers blood sugar among other benefits-Military Diet (Figure 3 HIIT -Workout-Facebook 2025), nutrition and peaceful environment, as reported by Green Peace Africa, 2025. Honey and other hive products, contribute

tremendously to food security, nutrition and improved health, by complementing conventional medicine through Api-therapy. Medicinal herbs exhibit great potential, singly or in combination, to drug development to treat or manage: Diabetes, cancer and hypertension. This concurs with other researchers, working on Coriander, *Coriandrum sativum* and Rosemary, *Murraya koenigii*, for cancer cure [3].

Conclusion

Type2 Diabetes is not a death sentence. It is reversible and can be prevented or managed, with prior awareness of the triggers (Trauma, stress or genetic). Management and treatment requires strict patient self-monitoring and multi-disciplinary approach, as observed by Powers with the Dietician playing a critical role in the choice of nutritious and healthy diets.

It is important to take note of individual traits, which determine each patient's response to Diabetes management and treatment. The versatile change in technology should be noted when considering choice of desired equipment.

References

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Appendix 1

Patient vital signs form

Time in _____ Date _____

Age _____

Gender (M/F) _____

Weight (kg) _____

Ip No. _____

BP _____

Pulse _____

Temp. _____

Resp _____

Pain _____

Sign _____

Appendix 2

A select world Diets-William Russel, 2023 (www-William-russel.com)

1. Okina Wan Diet (Japan)-Fish, sea food, bitter melon, soy beans and rice
2. Mediterranean Diet-Vegetables, fruits, nuts, seeds, whole grains, fish, sea food and olive oil
3. Indian Diet-Grains, lentils, lean meat, vegetables, ghee, herbs, spices
4. Nordic Diet-Local fish, seasonal fruits, vegetables, whole grain, nuts and seeds
5. Greek cuisine-Protein pork, poultry, lamb, goat, fresh herbs, vegetables, olive oil, cheese and yoghurt
6. Korean Diet-Rice, vegetables, soybeans, tofu, sea food, fish, kimchi and spices
7. Italian Diet-Whole grains, tomatoes, vegetables, fish, poultry, olive oil, cheese and fresh herbs
8. West African cuisine-Sweet potatoes, plantains, rice, fruit, vegetables, ackee, jackfruit, aubergine, papaya, spices and chillies
9. French Diet-Full fat cheese, yoghurt, butter, bread, fresh fruit,, vegetables, small portions of meat
10. Thai cuisine-Colourful vegetables, noodles, rice, coconut milk, shrimp, tofu, chicken, herbs and spices

Website: www-William-russel.com

Appendix 3

Mediterranean Diet for beginners, by David daniels, 2024 (Facebook)

Foods high in zinc, vitamin, biotin, potassium, omega

1. Vitamin C: Kiwi, acerola cherries, pineapple, bell peppers, mango, cabbage
 2. Zinc: Beef, pumpkin seeds, Shiitake mushroom, cashews, grilled chicken, black beans
 3. Biotin: Almonds, eggs, sweet potatoes, spinach, salmon, sunflower seeds
- Potassium: Butter nut/squash, coconut water, watermelon, oranges, avocados, bananas
- Omega: Sardines (fish), walnuts, oysters, hemp seeds, brussel sprouts, chia seeds

Appendix 4

Easy Diabetic Recipe by Arya Cooper, Facebook, 2025

High sugar >7.0 mm01/2(126mg/dL) when fasting	Low sugar >11.0 mm01/2(200mg/dL) 2hrs after meals (WHO)
Bananas	Peaches
Grapes	Strawberry
Pineapples	Avocado
Litch	Blue berries
Cherries	Apples
Pomogranade	Oranges