OPEN ACCESS JOURNALS
Indiana Journal of Agriculture and Life Sciences
Abbriviate Tittle- Ind J Agri Life Sci
ISSN *(Online)*- 2583-1623
Journal Homepage Link- https://indianapublications.com/journal/IJALS
DOI- 10.5281/zenodo.7086101

INDIANA PUBLICATIONS
PRODUCTIVE AND QUALITY RESEARCH

Research Article

Volume-02|Issue-05|2022

Glycaemic Control of Diabetes Using *Solanium Nigrum* (UNH 333a) Leaves in Geriatrics on Metformin Monotherapy

Obi, L. C.*[1], Ikele, M. O.[2], Onyegbutulem, H.[1], Umeoduagu, N. D.[3], Ganda, S.[1], & Ochuba, C. O.[4]

[1]Asokoro District Hospital, Abuja, Nigeria
[2]Nnamdi Azikiwe University, Awka, Nigeria
[3]Tansian University, Umunya, Nigeria
[4]Maastricht University, Netherlands

Article History
Received: 07.09.2022
Accepted: 12.09.2022
Published: 15.09.2022

Citation
Obi, L.C., Ikele, M. O., Onyegbutulem, H., Umeoduagu, N.D., Ganda, S., & Ochuba, C.O. (2022). Glycaemic Control of Diabetes Using Solanium nigrum (UNH 333a) Leaves in Geriatrics on Metformin Monotherapy. *Indiana Journal of Agriculture and Life Sciences*, *2*(5), 9-11.

Abstract: *S. nigrum* is a widely cultivated plant in Nigeria whose leaves are used for several purposes ranging from food constituent to indigenous medicine. Its pharmacological properties have been attributed to the presence of several phytochemicals. Diabetes mellitus is a major global health problem and one of the leading causes of death worldwide. This work aimed at evaluating the control of type II diabetes in geriatric patients on metfromin monotherapy with *S. nigrum* leaves administration. A total of twelve patients were used for the study. Six of them served as control group while the other half were used as test patients. A 10 g portion of fresh leaves were administered to the patients twice daily through a three-month period. Glycated haemoglobin ($HbA1_C$), fasting blood sugar and 2-hours post-prandial (2-HPP) blood glucose levels were monitored using standard laboratory protocols. There was significant ($P \leq 0.05$) decrease in $HbA1_C$ levels of the test patients when compared with the control group. NO significant ($P \geq 0.05$) differences existed in their fasting blood sugar and 2-HPP levels. These findings thus show that *S. nigrum* is effective in the control of diabetes in geriatric patients on metformin monotherapy through $HbA1_C$ modulation.

Keywords: Nutraceutical, 2-HPP, geriatrics, $HbA1_C$.

INTRODUCTION

Diabetes is a disorder in carbohydrate, protein and fat metabolism, which affects all age groups worldwide (Aguwa & Omole 2012). The percentage of deaths attributable to high blood glucose or diabetes that occurs prior to age 70 is higher in low- and middle-income countries than in high-income countries (Okpara and Odili, 2010). Metformin is an inexpensive and established oral glucose-lowering agent widely used in the treatment of type 2 diabetes (Inzuchi, 2002). The eggplants form part of the traditional sub-Saharan African culture. The fruits, said to represent blessings and fruitfulness, are offered as a token of goodwill during visits, marriages and other social events. The pharmacological properties of *Solanium nigrum* have been attributed to the presence of certain chemical substances in the plants, such as fiber, ascorbic acid, phenols, anthocyanin, glycoalkaloids and α-chaconine (Gaikwad *et al*., 2014). Several works had been done using mice and rabbit models to determine the effect of extracts of *Solanium nigrum* on diabetes. This work thus looks at further assessing the effect of *Solanium nigrum* (UNH 333a) on diabetes using human models. The aim of this research is to evaluate the glycaemic control of type 2 diabetes using *Solanium nigrum* leaves in geriatrics on metformin monotherapy.

METHODS

Study Design

The research made use of Interventional study design. A total number of twelve geriatric diabetic patients (six for control and other six patients were used as test patients) that are poorly managed were used for the study over a period of three months.

Ethical Consideration

Ethical approval was granted by the ethics board and research committee of Asokoro District hospital, Abuja. Patients consents were duly obtained after one on one discussion and consent forms filled, signed and documented.

Sampling Method

Convenience sampling method was adopted for this research.

Sampling Setting

Poorly managed Geriatric diabetic patients (≥65years) that attend clinic at Asokoro District Hospital Abuja.

Eligibility Criteria

- Geriatrics on metformin monotherapy only.
- Geriatrics ≥65 years.

***Corresponding Author:** Obi, L. C.

- Geriatrics on poorly controlled blood glucose.
- Patients willing to comply with the life style modifications and hospital visits.

Research Design for the Administration of *S. nigrum* Leaves

Baseline tests were first performed on the patients, after which they were placed on 10 g twice daily oral consumption of fresh, saline washed garden egg leaves (first thing in the morning and last thing at night). Participants were asked to maintain a routine of 30 minutes morning aerobics, healthy dietary habits and to take their last meals at most, 7 pm daily. Daily glucose parameters monitoring (HBA_{1C}, FBS and 2-HPP) of the test patients and control patients were performed for a 3-month period. Control patients were on metformin therapy only.

Haemoglobin A1c (HBA1c) Determination

Blood sample was collected into an EDTA anticoagulant vacutainer bottle, mixed properly by simple inversion and then labeled with patient's name, age and sex.

A100 µl aliquot of hemolysis buffer was added into detection buffer tube. Thereafter, whole blood was drawn from patients and added to the capillary tube in the buffer tube. The detection buffer tube was gently shaken and centrifuged, and added into the catridge chamber of the Schroma machine for 12 minutes, and the results were read from the Schroma reader.

Fasting Blood Sugar (FBS) Determination

Fasting blood sugar readings were taken using an automated chemistry analyzer (Vitro Scient machine) at 500 nm.

2 – Hours Post Prandial Test (2HPP) Determination

Patients were asked to take adequate carbohydrate meals, and immediately after eating, they were timed for 2 hours. At exactly 2 hours after meal, venous blood samples were taken for the 2HPP test, and transferred into a fluoride oxalate anticoagulant container. 2-HPP readings were taken using an automated chemistry analyzer (Vitro Scient machine) at 500 nm.

Statistical Analyses

Means were analyzed using Analysis of variance with significance level at $P \leq 0.05$.

RESULTS

Effect of Oral Administration of *Solanium nigrum* and Metformin on HBA1C

HBA1C values of the patients significantly ($p \leq 0.05$) decreased from 6.03±0.63 as initial mean readings to 5.52±0.43 as final mean readings of the patients under study, with a p value of 0.038 at 95 % confidence interval as shown on Table 1.

Effect of Oral Administration of *Solanium nigrum* and metformin on Fasting Blood Sugar

Fasting blood sugar values of the patients slightly increased from 6.68±0.89 as intial mean readings to 6.88±0.66 as final mean readings of the patients under study, with a p value of 0.657 at 95 % confidence interval as shown on Table 2.

Effect of Oral Administration of *Solanium nigrum* and Metformin on 2HPP

2HPP values of the patients slightly increased from 9.37±1.07 as intial mean readings to 9.90±1.65 as final mean readings of the patients under study, with a p value of 0.381 at 95 % confidence interval as shown on Table 3.

Table 1: Effect of Oral Administration of *Solanium nigrum* and Metformin on HBA1C

HBA1C	Mean±S.D Test patients	Control Patients
Initial	6.03±0.63	6.22±0.46
Final	5.52±0.43	9.20±0.55
P value	0.038	

Table 2: Effect of Oral Administration of *Solanium nigrum* on Fasting Blood Sugar

Fasting Blood Sugar	Mean±S.D Test patients	Control Patients
Initial	6.68±0.89	5.58±0.16
Final	6.88±0.66	6.90±0.05
P value	0.657	

Table 3: Effect of Oral Administration of *Solanium nigrum* on 2HPP

2HPP	Mean±S.D Test patients	Control patients
Initial	9.37±1.07	8.3±0.45
Final	9.90±1.65	8.92±0.33
P value	0.381	

DISCUSSION

Administration of *S. nigrum* leaves to the test geriartic patients, already on metformin monotherapy, significantly ($p \leq 0.05$) brought down the glycated haemoglobin (HBA1C) values of these patients within the period of study (Table 1). According to Jesudason *et al*. (2003), HBA1C primarily identifies average plasma glucose concentrations over prolonged period of time. HBA1C has been a standard test of long term average blood glucose control for persons with type 2 diabetes, for more than a decade (The international expert committee, 2009), and blood levels above accepted thresholds are used to diagnose both pre-diabetes (between 5.7 and 6.4%) and diabetes (above 6.4%). HBA1C is also an accurate marker for the prediction of complications just as fasting blood sugar is reliable in separating diabetic from non-diabetic subjects (Ghazanfaris *et al*., 2010). Thus, this implies that the

***Corresponding Author:** Obi, L. C.

plasma glucose levels of these patients were reduced more than it was when they were using metformin alone. Hence, incorporating *S. nigrum* into diabetic patients' diet will add positively to whatever conventional treatment module they are receiving at their health care facilities. This finding agrees with the report of Rani *et al*., (2017) that *Solanium* leaves possesses α– glucosidase inhibitory ability. The finding of Nandi *et al*. (2016) corroborated the above results in their report that *Solanium nigrum* leaf extracts, possess antidiabetic activities, and also show beneficial health effects on the hepatic and renal profile as well as total lipids levels.

There was no significant difference ($p \geq 0.05$) observed in the fasting blood sugar and 2 hours post prandial (2HPP) levels of the patients with the oral administration of *S. nigrum* (Tables 2 and 3). This perhaps implies that *S. nigrum* has effect on glycated haemoglobin which has less day-to-day variability, but has no effect on fasting blood sugar and post prandial spikes which are highly variable and more dependent on the food that was ingested or not ingested per time (Sacks *et al*., 2002). Consequently, it can be deduced from this result that *S. nigrum* leaves had more precise and effective control on diabetes through HBA1C glucose modulation. Sundaram (2012) reported significant decrease in fasting blood sugar levels in rat model diabetes controlled with ginseng root, which did not have significant effect on glycated haemoglobin. This observation can imply that different plant sources with antidiabetic potentials can give prolonged or temporal controls on serum glucose levels, as seen from *S. nigrum* leaf and ginseng root experiments. Furthermore, the absence of significant increase in fasting blood sugar and 2HPP could also be explained to be as a result of contributory effect of routine exercise the patients were subjected to.

In Nigeria, the use of herbal medicine alone or alongside prescription drugs for the management of diabetes is quite common (Ezurike *et al*,2014). Research on and the review of medicinal plants traditionally used for diabetes management have become necessary so that based on the available evidence on their pharmacology and safety, their therapeutic potential can be properly harnessed for possible integration into the country's healthcare system.

CONCLUSION

This research work has been able to portray that *S. nigrum* leaves have antidiabetic activity by Hb_{A1C} modulation. It has also gone further to show that dietary adjustment for geriatrics on metformin monotherapy, to *S. nigrum* consumption, could aid them in diabetes management.

REFERENCES

1. Aguwa, C.N., & Omole, M.K. (2012). Diabetes mellitus. In *Therapeutic Basis of Clinical Pharmacy in tropics* (4th Ed.; Pp. 349-350). Snaap press ltd., Enugu Nigeria.
2. Ezuruike, U. F., & Prieto, J. M. (2014). The use of plants in the traditional management of diabetes in Nigeria: Pharmacological and toxicological considerations. *Journal of Ethnopharmacology*, *155*(2), 857-924.
3. B Gaikwad, S., Krishna Mohan, G., & Sandhya Rani, M. (2014). Phytochemicals for diabetes management. *Pharmaceutical Crops*, *5*(1).
4. Ghazanfari, Z., Haghdoost, A. A., Alizadeh, S. M., Atapour, J., & Zolala, F. (2010). A Comparison of HbA1c and Fasting Blood Sugar Tests in General Population. *International journal of preventive medicine*, *1*(3), 187–194.
5. Inzucchi, S. E. (2002). Oral antihyperglycemic therapy for type 2 diabetes: scientific review. *Jama*, *287*(3), 360-372.
6. Jesudason, D. R., Dunstan, K., Leong, D., & Wittert, G. A. (2003). Macrovascular risk and diagnostic criteria for type 2 diabetes: implications for the use of FPG and HbA1c for cost-effective screening. *Diabetes care*, *26*(2), 485-490.
7. Nandita, D., Muthukumar, S. P., & Murthy, P. S. (2016). Solanum nigrum leaf: natural food against diabetes and its bioactive compounds. *Research Journal of Medicinal Plant*, *10*(2), 181-193.
8. Okpara, A. C., & Odili, Vu. (2010). *Pharmaceutical care in diabetes mellitus in Essentials of Pharmaceutical care* (pp. 285-296). Published by A Cybex publication.
9. Rani, Y. S., Reddy, V. J., Basha, S. J., Koshma, M., Hanumanthu, G., & Swaroopa, P. (2017). A review on Solanum nigrum. *World J. Pharm. Pharm. Sci*, *6*, 293-303.
10. Sacks, D. B., Bruns, D. E., Goldstein, D. E., Maclaren, N. K., McDonald, J. M., & Parrott, M. (2002). Guidelines and recommendations for laboratory analysis in the diagnosis and management of diabetes mellitus. *Clinical chemistry*, *48*(3), 436-472.
11. Sundaram, R., Naresh, R., Shanthi, P., & Sachdanandam, P. (2012). Antihyperglycemic effect of iridoid glucoside, isolated from the leaves of Vitex negundo in streptozotocin-induced diabetic rats with special reference to glycoprotein components. *Phytomedicine*, *19*(3-4), 211-216.
12. International Expert Committee. (2009). International Expert Committee report on the role of the A1C assay in the diagnosis of diabetes. *Diabetes care*, *32*(7), 1327-1334.

***Corresponding Author:** Obi, L. C.