JPRM
Journal of Preventive and Rehabilitative Medicine

2021; 3(2): 21-23
PublishedOnline:01/06/2021
(https://journals.unza.zm/index.php?journal=medicine)
DOI: 10.21617/jprm2021.326

ISSN: 2415-038X (Print)

COMMENTARY Open Access

Commentary on the Antidiabetic Activity of Kigelia Africana

Tumelo Muyenga- Akapelwa[1*], Christian E. Ezaela[1], Festus Mushabati[1], Samuel Dominion Kayonde Bamitale[2], Dan Kibuule[3]

[1]Department of Physiological Sciences, School of Medicine and Health Sciences, Mulungushi University, [2]Deapartment of Pharmacology and Therapeutics, School of Pharmacy, Faculty of Health Sciences, University of Namibia,
[3]Department of Pharmacy Practice and Policy, School of Pharmacy, Faculty of Health Sciences, University of Namibia

To cite: Muyenga-Akapelwa T, Ezaela CE, Mushabati F, Bamitale SDK, Kibuule D., Commentary on the Antidiabetic Activity of Kigelia Africana. JPRM 2021, 3 (2): 21-23. doi: 10.21617/jprm2021.326

INTRODUCTION

Kigelia Africana Lam (Benth) a plant of the Bignoniaceae family, is a medicinal plant with many medicinal properties [1]. Of interest to this paper are the highlighted blood-glucose-lowering activities of the plant, which have led to its use among traditional healers in Zambia [2] and other parts of Africa [3,4,5] Traditional healers in Zambia macerate the fruit using water as a solvent which is drunk as prescribed [6] Anecdotal evidence suggests that the patient takes the fruit maceration twice daily after meals.

REPORTED RESEARCH FINDINGS

Several scientists have in the recent past reported Kigelia's blood-glucose-lowering activities in rat and mice diabetic models; In Zambia Muyenga *et al.* (2015), demonstrated how the crude aqueous fruit extract of Kigelia could reduce blood glucose levels in alloxan-induced diabetes mice models [6]. Similarly, Njogu *et al.,* (2018) in Kenya showed the blood-glucose-lowering effect of the aqueous and ethyl acetate leaf and fruit extracts in alloxan-induced diabetes mice models [7]. Although studies proving folklore information about its use to treat several ailments are being published, there is still a need to intensify investigations into the plant to pave way for clinical trials in human beings and isolate molecules that researchers may use as pharmacophores for future drugs [8, 9]

Researchers accredit the diverse therapeutic use of Kigelia to its diverse phytochemistry. Some researchers suggest that the plant's phytochemistry may vary in different geographical regions due to soil diversities [10]. Studies have reported that Kigelia contains a wide variety of secondary metabolites like saponins, terpenes, flavonoids, alkaloids, naphthoquinones, iridoids, glycosides, anthraquinones [11,12,13]. Khan and colleagues., (2011) in India isolated different compounds among which included iridoid glycosides from the twigs of Kigelia Africana. They reported that the plant extract caused stimulation of GLUT-4 translocation to the cell surface in skeletal muscle cells [15]. A review article conducted by Shah and colleagues reported that naphthoquinones are excellent candidates for antidiabetic activity because they have different effects on glucose metabolism. Naphthoquinones may reduce glucose uptake from the gastrointestinal tract, cause changes in carbohydrate metabolizing enzymes, affect glucose uptake in the muscle, increase insulin sensitivity in tissue and improve insulin secretion [16]. However, there is still scanty information identifying the active antidiabetic principles found in this plant's fruit. The identification of active antidiabetic phytoconstituents could provide a steppingstone for identification of pharmacophores responsible for the observed antidiabetic activity and provide a basis for identification of pharmacophores with ameliorative properties.

With recent research proving the efficacy of parts of Kigelia Africana towards the management of diabetes; one study that may be highlighted was that

conducted by Nyarko *et al.,* (2012) in Nigeria. It showed that a mixture of four herbs (which included Kigelia Africana) and titled "ADD-199" mixture could increase plasma insulin concentration in treated mice and antioxidant activities [17]. However, considering that this study looked at a mixture of herbs, there could have been synergistic activity from the other plants that were contained. Said *et al.,* (2019) showed that not only did the stem bark of Kigelia Africana reduce plasma blood glucose, but it also reduced serum levels of total cholesterol (TC); triacylglycerols (TAG); low density lipoproteins cholesterol (LDL-C); very low-density lipoproteins (VLDL), and albumin while, high density lipoproteins HDL significantly increased [18]. Thus, demonstrating the plants' potential to be used to manage complications associated with diabetes. Finally, Fagbohun *et al.,* (2020) also showed that the fruit extracts of Kigelia Africana protects against biochemical, hematological, and histological changes that are injurious in streptozotocin diabetes-induced rats. While a review of literature has shown that Kigelia Africana fruit extract has a large therapeutic index; [19, 20], there is no published literature discussing its mutagenic activity. However, bearing in mind that diabetic patients would use the fruit extract for long-term management of symptoms of diabetes, there is a need to determine the mutagenic properties of the fruit extract. While some papers have reported anti mutagenic properties of the stem bark of Kigelia Africana [21], the results may not be generalizable since there could be differences in the chemical composition of the fruit compared to the stem bark.

CONCLUSION

Scientists continue to investigate the use of Kigelia Africana plant parts for the management of diabetes. However, there is still little published information discussing active antidiabetic principles, especially in the fruit. Further, there is limited information discussing the mechanism by which the plant extract provides its antidiabetic activity. While studies have showed that the plant stem bark's extract has a large therapeutic index, there is no published information discussing the mutagenic properties of the plant.

DECLARATION

Competing interests There were no competing interests from all authors in this study.

Funding This article is part of research activities being carried out under the supervision of the University of Namibia and the funding of the Mulungushi University.

REFERENCES

1. G. Olatunji A and A. Olubunmi, "Comprehensive scientific demystification of Kigelia africana: A review," p. 7, Jul. 2009.

2. T. A. Muyenga, D. Musonda, and M. Chigunta, "(PDF) Tumelo Akapelwa Muyenga. Delilah Musonda, Michael Chigunta. Ethnobotanical. Survey of Medicinal Plants Used In Treatment of Diabetes in Chipulukusu Compound, Ndola District, Zambia. Zambia," ResearchGate, Jan. 2018. https://www.researchgate.net/publication/335714469_Tumelo_Akapelwa_Muyenga_Delilah_Musonda_Michael_Chigunta_Ethnobotanical_Survey_of_Medicinal_Plants_Used_In_Treatment_of_Diabetes_in_Chipulukusu_Compound_Ndola_District_Zambia_Zambia (accessed Jun. 05, 2020).

3. B. Amuri, M. Maseho, L. Simbi, P. Duez, and K. Byanga, "Ethnobotanical survey of herbs used in the management of diabetes mellitus in Southern Katanga Area/DR Congo," Pan Afr. Med. J., vol. 30, Jul. 2018, doi: 10.11604/pamj.2018.30.218.11718.

4. M. S. Demoz, K. P. Gachoki, K. J. Mungai, and B. G. Negusse, "Ethnobotanical Survey and Preliminary Phytochemical Studies of Plants Traditionally Used for Diabetes in Eritrea," Eur. J. Med. Plants, pp. 1–11, Jun. 2015, doi: 10.9734/EJMP/2015/18777.

5. M. Sco, O. Ab, O. Ts, and A. Ts, "An Ethnomedical and Ethnobotanical survey of Plants Herbal Therapy used for Obesity, Asthma, Diabetes and Fertility by the Badagry people of Lagos State, Nigeria," p. 6, Mar. 2015.

6. T. Muyenga, L. Prashar, T. Muungo, and A. G. Bwalya, "The effect of Kigelia Africana fruit extract on blood glucose in diabetes induced mice," ResearchGate, Sep. 2015. https://www.researchgate.net/publication/335528459_The_effect_of_Kigelia_Africana_fruit_extract_on_blood_glucose_in_diabetes_induced_mice (accessed Jul. 22, 2020).

7. S. M. Njogu, W. M. Arika, A. K. Machocho, J. J. N. Ngeranwa, and E. N. M. Njagi, "In Vivo Hypoglycemic Effect of Kigelia africana (Lam): Studies With Alloxan-Induced Diabetic Mice," J. Evid.-Based Integr. Med., vol. 23, p. 2515690X18768727, Jan. 2018, doi: 10.1177/2515690X18768727.

8. H. Yuan et al., "How Can Synergism of Traditional Medicines Benefit from Network Pharmacology?" Molecules, vol. 22, no. 7, Art. no. 7, Jul. 2017, doi: 10.3390/molecules22071135.

9. A. Singh, S. Kumari, A. K. Singh, and N. K. Singh, "Ethnopharmacology and pharmacology of Kigelia africana (Lam.) Benth.," Int. J. Green Pharm., vol. 11, no. 2018 | S31, p. 10, Dec. 2018.

10. A. G. Osman, Z. Ali, A. G. Chittiboyina, and I. A. Khan, "Kigelia africana fruit: Constituents, bioactivity, and reflection on composition disparities," World J. Tradit. Chin. Med., vol. 3, no. 4, p. 1, Oct. 2017, doi: 10.4103/wjtcm.wjtcm_15_17.

11. I. Bello, M. W. Shehu, and M. Mustapha, "Kigelia africana (Lam.) Benth. (Sausage tree): Phytochemistry and pharmacological review of a quintessential African traditional medicinal plant - ScienceDirect," Aug. 02, 2016. https://www.sciencedirect.com/science/article/pii/S0378874116303300 (accessed Jan. 21, 2020).

12. S. S. Said, M. A. Abdullahi, and S. A. Aminu, "(8) (PDF) Said et al. International Journal of Modern Pharmaceutical Research HYPOGLYCEMIC AND HYPOLIPIDEMIC EFFECT OF STEM BARK EXTRACT OF Kigelia Africana (SAUSAGE TREE) ON ALLOXAN INDUCED DIABETIC EXPERIMENTAL RATS," ResearchGate, 12 2019. https://www.researchgate.net/publication/338126925_Said_et_al_International_Journal_of_Modern_Pharmaceutical_Research_HYPOGLYCEMIC_AND_HYPOLIPIDEMIC_EFFECT_OF_STEM_BARK_EXTRACT_OF_Kigelia_Africana_SAUSAGE_TREE_ON_ALLOXAN_INDUCED_DIABETIC_EXPERIMENTAL_ (accessed Jun. 29, 2020).

13. E. N. Uhuo, L. U. S. Ezeanyika, and V. N. Ogugua, "Effects of Ethanol Leaf and Fruit Extracts of Kigelia africana on Some Oxidative and Biochemical Parameters of Alloxan -Induced Diabetic Rats," Asian J. Res. Biochem., Mar. 2018, doi: 10.9734/AJRB/2017/39152.

14. M. F. Khan, D. Preety, N. Jaiswal, A. K. Tamrakar, A. K. Srivastava, and R. Maurya, "Chemical constituents of Kigelia pinnata twigs and their GLUT4 translocation modulatory effect in skeletal muscle cells," vol. 83, pp. 125–129, Oct. 2011.

15. M. F. Khan, P. Dixit, N. Jaiswal, A. K. Tamrakar, A. K. Srivastava, and R. Maurya, "Chemical constituents of Kigelia pinnata twigs and their GLUT4 translocation modulatory effect in skeletal muscle cells," Fitoterapia, vol. 83, no. 1, pp. 125–129, Jan. 2012, doi: 10.1016/j.fitote.2011.10.002.

16. M. A. Shah, J. E. Keach, and P. Panichayupakaranant, "Antidiabetic Naphthoquinones and Their Plant Resources in Thailand," Chem. Pharm. Bull. (Tokyo), vol. 66, no. 5, pp. 483–492, May 2018, doi: 10.1248/cpb.c17-00529.

17. L. K. N. Okine, A. K. Nyarko, N. Osei-Kwabena, I. V. Oppong, F. Barnes, and M. Ofosuhene, "The antidiabetic activity of the herbal preparation ADD-199 in mice: a comparative study with two oral hypoglycaemic drugs," J. Ethnopharmacol., vol. 97, no. 1, pp. 31–38, Feb. 2005, doi: 10.1016/j.jep.2004.09.048.

18. N. Saeed, M. R. Khan, and M. Shabbir, "Antioxidant activity, total phenolic and total flavonoid contents of whole plant extracts Torilis leptophylla L," BMC Complement. Altern. Med., vol. 12, no. 1, p. 221, Nov. 2012, doi: 10.1186/1472-6882-12-221.

19. O. F. Fagbohun, P. O. Awoniran, O. O. Babalola, F. K. Agboola, and T. A. M. Msagati, "Changes in the biochemical, hematological and histopathological parameters in STZ-Induced diabetic rats and the ameliorative effect of Kigelia africana fruit extract," Heliyon, vol. 6, no. 5, p. e03989, May 2020, doi: 10.1016/j.heliyon. 2020.e03989.

20. H. M. Farah, A. M. E. Hussein, H. E. Khalid, and H. M. Osman, "Toxicity of Kigelia africana Fruit in Rats," Adv. Res., pp. 1–9, 2017, doi: 10.9734/AIR/2017/38539.

21. E. Y. Abdul-Hafeez, N. S. Karamova, and O. N. Ilinskaya, "Evaluation of mutagenic and antimutagenic potential of stem bark aqueous extracts of eight trees by the bacterial reverse mutation assay," Ecol. Genet., vol. 16, no. 3, Art. no. 3, Oct. 2018, doi: 10.17816/ecogen16355-61.