Int. j. adv. multidisc. res. stud. 2022; 2(1):95-99

Received: 19-12-2021
Accepted: 28-01-2022

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Proximate, Elemental, and Phytochemical screening of corn beard (maize style), with respect to its Medicinal uses

[1] G Owoeye, [2] D Oke, [3] IA Owokotomo, [4] K Akinola, [5] S Olaoye

[1, 3, 4, 5] Department of Chemistry, Federal University of Technology, Akure, Nigeria

[2] Department of Forest and Wood Technology, Federal University of Technology Akure Ondo State, Nigeria

Corresponding Author: **G Owoeye**

Abstract

Maize corn (zea may^{s} called Indian corn) has been used as food both as corn and flour as any other dishes. It belongs to the family called *gramineae* and, is the third most important cereal crop in the world after wheat and rice (FAO 1992). Therefore, this research seeks to study the corn beard for its medicinal use by caring out the proximate analysis, elemental, phytochemical screening and animal assay. using standard methods, the result of the study shows its moisture content: 4.30±0.02% protein content: 6.93±0.01% crude fibber:10.20±0.03% fat content: 3.80±0.12% and carbohydrate: 74.76% and the elemental show the present of potassium, sodium, manganese. magnesium, calcium and iron with the absent of nickel, cadmium, chromium and cobalt. While the phytochemical screening indicated the present of flavonoid, saponinin, tannin, phytobathalin, steroid, terpenoid cardiac glycoside. The antidiabetic, weight loss test and assay with the albino rat was positive., In conclusion. the present of some essential element, protein, with high fiber content and positive test to phytochemical screening, together with the spontaneous reaction with the albino rat assay, blood glucose level and body weight test indicated its medicinal potential, and that boiled distilled water extract of corn beared can be used to cure diabetes type II.

Keywords: Maize corn, corn beard, proximate, animal assay and diabetes

Introduction

Diabetes mellitus is a major problem in all parts of the word Almost 3.2 million people die of the diseases called diabetes across the world every year. (Wild *et al.*, 2004) [25]" Management of diabetes without any all-round positive effect is still a challenge to the medical. (Marles and Farnworth 1995) [14]". This situation has led to increasing demand for matural products with antidiabetic activity, that are safe, effective, less expensive and affordable with fewer side effect. The developing nations of Africa are rich in biodiversity and indigenous knowledge particularly ethnomedical practice. (Mann *et al*, 2003) [13]" Nigeria is endowed with rich biological heritage including lots of medicinal plants that are distributed throughout the country and among this is the corn maize (Zea^{s} may) beared.

Year after year maize has been produced in this country and outside the country and its application as food both to man and animal cannot be overemphasized, especially human being and animals. The common varieties are the yellow and white types but this research is considering the yellow type beared called Indian corn.

Indian Corn

It Is an annual plant of gramineae family with separated male and female flower. The flower latter gather in a pike which latter become the corn cob, a style of about 20cm long grown form the beard of corn while the fruit are corns grain. Corn Is a native to central America and Mexico now cultivated worldwide as food and forage. Maize is the most widely grown crop in southern Nigeria where is prepared and consumed boiled, baked, fermented or roasted. (Obilana and Fagemisin 1997) [15]" It is also widely utilized as the main constituent of livestock feeds serving as the fattening per excellence high in energy low in fiber and therefore highly digestible. Mirracle (1972) [11]" Moreover Corn grain contain sugar and carbohydrate (70 – 77%), protein (7 – 19%), and fat (3 –5%) as well as mineral and trace element. however, like rice it lacks glutein and this make it very useful for people who suffer from coeliec disease and for children suffering from intestinal maladsorption and chronic diarrhea. Paploma (2005) [7]" The corn hair are styles of its flower, has an excellent diuretic property and are recommended for high blood pressure, kidney stone problem. It Is use as medicine, by drinking the water extracted solution either in cool or hot clean water

(paploma 2005) [7]". In-spite of the various application of maize in all area of providing nutrition to human being and animal there is need to determine the usefulness of the corn beard and the chemistry of its medicinal use. Moreover, diabetes is a disorder in which not enough insulin Is present in the blood stream to move glucose into cell and use it for energy as a result of the ineffective level of insulin blood glucose rise. The symptom and complication of diabetes are caused by this affected blood glucose. It is characterized by the present of glucose in the urine. Finch and Williams (1999) [5]. There two types: Type I and II.

Symptom and diagnose.

Frequent urination and thirsty, estreme hungry, rapid weight loss, blurred vision or sudden change in vision activity, easy tiring drowsiness, or general weaken of the eye may occur or persist, the disease can cause death. Several reports have been reported on the nutrition derived from maize corn and the impact of the plant in agricultural environment together with its application in several different ways of its use as food, but few report is known about the corn beard and its medicinal application in area of health. Therefore, this research seeks to investigate the medicinal application of corn beard by caring out the elemental analysis, proximate, phytochemical screening and animal assay of the extract on albino rats, effect of glucose levels and body weight on the animal, in other to ascertained its medicinal potentials.

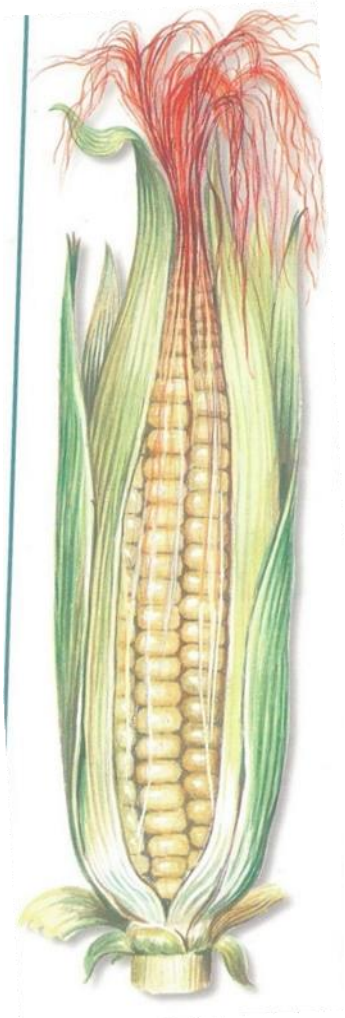

Fig 1: Corn

Experimental

Materials and method

Preparation of sample: Five freshly mature maize cob was plucked from the main maize stem, these cobs was taken to the Agricultural laboratory in the Department of Crop and Pest Federal University of Technology Akure Ondo state Nigeria for identification, then bears from the samples were removed, cleaned with distilled water and dried, later packed inside cleaned PVC plastic until when needed and the quarantine laboratory animal was used for the research. study on the anti-diabetic test, assay, and the body weight.

Two groups of albino rat were also purchased from the animal house, after quarantine procedures, at the Department of Animal production and Health Federal university of Technology Akure.

Methods

Phytochemical screening: (using Edeoga *et al*, 2005) [3] 15g of the prepared samples was soaked in ethanol for eight to twelve hours in an enclose glass ware, then the extracted solution was decanted into a clean container. The decanted sample solution was screen for phytochemical using standard method. It was screen for tannin, steroid, cardiac glycoside. Phytobatathalin, flavonoid, terpenoid, alkaloid, antraquinone and saponin.

Test for Tannin

5ml of the prepared sample was boiled in 20ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride were added to the filtrate and observed for brownish or blue-black coloration.

Test for saponin

2ml of the sample was boiled with distilled water and filtered. 10ml of the filtrate was mixed with 5ml distilled water and shaked for stable persistence froth. The froth was mixed with three drop of olive oil and then shaked vigorously and observed for emulsion formation.

Test for flavonoid

Aqueous solution of the sample was added with 5ml of dilute ammonia solution followed by 1ml of concentrated sulphuric acid a yellow coloration indicated the present of flavonoid which disappeared on standing.

Test for cardiac glycoside (keller killani test)

5ml of the extract ample a treated with 2ml of glacial acetic acid containing one drop of ferric chloride solution. This was underlayed with 1ml of concentrated sulphuric acid. A brown ring at the interface indicates a deoxy sugar characteristic.

Test for steroid

2ml of acetic anhydride was added to 1ml of the sample with 2ml of concentrated sulphuric acid. Color change from violet to blue or green with the ample indicate the present of steroid

Test for alkaloid

2ml of the sample was stirred with 5ml of aqueous solution of hydrochloric acid on a steam bath a 1ml of this mixture was treated with few drops of wagner reagent. Present of turbidity indicate the preliminary presence of alkaloid.

Test for Anthraquinone
Bornstrager test was used for the detection. 5ml of the sample was mixed with 10ml of benzene and 5ml of 10% of ammonia solution added, the present of violet color indicate the present of anthraquinone (Harbone 1973) [9].

Elemental analysis
Two gram of the prepared sample was weight into a clean weight crucible for ashing inside muffle furnace at 550ºC for one hour. The ashed sample was dissolve with 0.1M HNO_3 inside the crucible and later filtered into a clean dried 100ml volumetric flask and was pour inside small PVC plastic bottle making ready for AAS analysis (AOAC 1995) [2]".

Proximate analysis
The proximate analysis of the bearded sample was also carried out using standard method. (AOAC1995) [2]".

Extract test with Albino rat
Two quarantine albino rat was used for the experiment, one for control and the other for experiment. One of the rats was injected after brake fast while the control was not injected after eating. After about one hour the injected rat was urinating profusely while the control remains unchanged.

Induction of experimental diabetes on albino rats
Male albino rats were fasted overnight (12 - 14hr) and their (80 - 300g) and fasting blood glucose level was recorded. One of the animals was made diabetic by single introperitonial injection of freshly alloxan monohydrate (100mg/kg) dissolve in normal saline, food and water were were presented to the animals after 30min. administration using (Decarvalio *et al*, 2003)", Kamalakkanon and prince (2003)" and Napappa *et al*, 2003)" methods. The animals were maintained according to international ethics of animal handling. (Guide for the care and use of laboratory Animals 1985)"

Experimental design
In this experiment, the rats were divided into four for evaluation of fasting blood glucose level. Normal control (administer with distilled water 2) Diabetic control (diabetic rats administer) 3): Diabetic treated with standard drug (Glibenclamide 500µmg/kg weight per body weight 4) Treated with hot distilled water extract of sample.

Administration of extract and drug
Extract and drug were administered orally by gavaging daily for one week using (Pari and Venkateswaran 2003) [21]" method and treatment commenced 72hrs after induction. Withdrawl of blood samples: Blood glucose level was determined using an Ache check glucosemeter with its commercial test strips based on glucose oxidase method. Blood samples were collected from the tip of tail on the day one and the 7th day interval throughout the study periods. (a week). Fasting blood glucose level and body weight measurement of all rats used were recorded on the day zero and the 7th day.during, the experimental period using (Nagappa *et al*, 2003) [18]" method. The blood glucose was determined after overnight fasting and those with clinical sign of diabetes with fasting blood glucose range above 150mg/dl using (Kumer *et al*, 2006, Gidado *et al*, 2005, Pari and Venkateswan 2003) [21]" method for the study.

Statistical analysis
Data were subjected to analysis of variance (ANOVA) as described by (Ihekoronye and Ngoddy 1985) [10]". The comparism of mean was perform by turkey test. Statistical different were considered to be significant at $p < 0.05\%$. Montgomery (2005)

Results, discussions and conclusions

Table 1: Phytochemical screening + results

Parameter	Observation
Tannin	+
Saponin	+
Flavonoid	+
Cardiac glycoside	+
Steroid	+
Alkaloid	+
Antraquinone	+
Glycoside	-

Table 2: Elemental analysis results

Parameter	Concentration (mg/l)
Calcium	161.51±0.1
Magnesium	20.56±0.02
Potaaium	6.98±0.01
Sodium	4.36±0.02
Iron	0.53±0.01
Copper	Nd
Zinc	1.83±0.02
Manganese	7.45±0.13
Chromium	Nd
Cadmium	Nd
Nickel	Nd
Lead	Nd

Table 3: Proximate analysis results

Parameter	Concentration (%)
Moisture	4.30±0.02
Fat content	3.8±0.12
Protein	6.93±0.01
Crude fibre	10.2±0.03
Carbohydrate	74.77±0.12

± Standard deviation, mean of triplicate determination

Table 4: Animal assay results

Parameter	Observation
Injected albino rat (after about one Hour)	Positive to the test (profuse) urination
Control albino rat (after about one hour):	Not affected

Table 5: Body weight of Albino rat

No of days	Control Albino rat (g)	Fasted albino rat (g)	Injected albino rat (g)
1st day	80.0±0.1	80.0±0.10	80.0±0.02
7th day	60.0±0.1	36.50±0.2	32.8±0.1

Table 6: Blood glucose level of rat

No of days	Control albino rat	Extract treated animal (mg/dl)	Drug treated animal (mg/dl)
1st day	239.66 ±62.10	299.0 ±10.2	253.20±28.50
7th day	266.30±10.10	206.15±8.3	115.13±20.92

± Standard deviation, mean of triplicate determination

Discussions

Table 1 above show the phytochemical screening of the ethanol extract of the sample, it indicated the present flavonoid, steroid, tannin, gardiac glycoside, phytobathalin, terpenoid. anthroquinone and alkaloid with the absent of glycoside. The flavonoid has been reported to have anti-inflammatory, anti-allergy, anti-viral, anti-mutagenic and vasodilatory activities and also have the ability of scavage hydroxyl radical, superoxide anion and lipid peroxyl radical as reported by (Terel. *et al*, 1986) [23]" and has strong anti-oxidant properties with free radical scavenger and metal chelator. These properties are likely responsible for its active response during albino test. saponins also are reported to have a number of biological activities among them is immunostimulating, and antiparasite effect, Gudu and Mazza (2007)". In addition, Saponin has anti-diabetic properties and have been found to be, potentially useful for treatment of hyperglycemia. (Olaleye (2007)". and Olayemi 2014)" also reported that saponins have been found to be anticarcinogenic, cholesterol decreasing and anti-inflamatory substance. These two important secondary metabolites are responsible for its medicinal use for diabetes. Because phytochemicals have healing properties. Table 2 indicated the elemental constituents of the sample with the highest amount recorded for calcium 161.51±0.10mg/l followed by magnesium 20.56±0.02mg/l while the potassium and sodium present have 6.78±0.01mg/l and 4.36±0.02mg/l respectively. The value observed for potassium is similar to the value reported for *opilia celtidifolia* leaves :6.81mg/l by (Olayemi *et al*, 2014)" and there is small significant different between the values observed for the two major microelements. Sodium and potassium are important in diet due to their role in blood pressure regulation, potassium has many functions for protein synthesis, action of many enzymes, stimulation of movement of intestinal tract. It is also necessary for the function of living cell as reported by Yoshimura *et al*, (1991)" Calcium is important in blood clothing, muscles contraction, essential for nerves impulse conductivity and activation of some enzymes which generate neutrotransmitters and an important component for healthy diet and a mineral necessary for life as reported by Adeyeye and fagbohun (2005) [1]". The heavy metals present are iron, and zinc while copper, nickel, cadmium, chromium and lead were absent. There is p resent of manganese with 7,45±0.13mg/l. Table 3 show the proximate analysis with moisture content of 4.3±0.02%, crude fiber: 10.20±0;03%, protein: 6.93±0.01%, fat content: 10.2±0.12% and carbohydrate: 76.74±0.12% The protein content has a significant higher value than the value reported for ripe plantain 0.55±0.05% by Uzuma *et al*, (2014)" also higher than that of African nutmeg 4.74% as reported by Ezeokonkwo *et al*, (2014)" but lower than that of momordica balsamina:17.83% as reported by Shera and Rosemary (2014) [22]" while table 4 indicated the animal assay with albino rats and the observed experiment was positive to the test.

Effect on the body weight

The result of the body weight and blood glucose level of normal control albino rat, diabetic non treated, standard drug treated (Glibenclimide 500µmg/kg) and the hot distilled water extract treated were shown on the table 5 above. There is significant increase in body weight of diabetic rats, when compared with control and animal treated with corn beared extract, it has a body weight that is decreasing and the effect is more pronounced than the those treated with drugs.

Effect of blood glucose level

Table 6 showed the various glucose level of treatment with oral glibenclimide and hot water extract of corn beared and the control, there is reduction in blood glucose level on the 7th day while the untreated albino rat showed increase in blood glucose level throughout the study period, The reduction of blood glucose level observed as a result of weight loss, may be due to high fiber content of the source that smooth out the blood sugar fluctuation and stabilizes the energy level. The initial blood glucose of the untreated diabetics control animal was 239.66±63.34mg/dl after 7th days of tested period the blood glucose level was increase to 267.33±10.42mg/dl but the extract treated albino rat has a significant decrease in blood glucose level and the induced diabetic rat when compare with the control. The initial reading of blood glucose level of extract was 299.00±10.13mg/dl after the test period there was a marked reduction in blood glucose level: 265.00±10.15mg/dl. In the control standard the initial glucose was 256.23±30.15mg/dl and the post test were 115.13±20.80mg/dl which showed that the standard the standard drug induced produced maximum hypoglycemic effect and the statistical analysis was significant and slightly higher than that of the extract induced. The result also reveal that the extract could not reduce the blood glucose level completely in the rat to its minimum while, those treated with standard drug (glibenclimide) had their blood glucose level suppressed to its minimum. The induced but not treated died during the period that is five days after. While the normal control animal saves throughout the research period. The extract from corn beared shows a promising result in the study of the activity against diabetes which is usually caused by the present of excess sugar in the blood and inability of the of the body not able to break down glucose into energy. Glibenclimide has been used for many years to treat diabetes in other to stimulate insulin secretion from pancreatic β cells. The present data indicated that the extract from hot distilled water of corn beard significantly reduced the elevated fasting blood glucose with respect to those of diabetic control animals This result also in line with the report from Paploma (2005) [7]" that, type II diabetes can normalize their blood sugar levels often within two weeks by eating very low-fat diet and higher fiber couple with exercise. The fiber content of the corn beared observed was 10.20±0.03%, and the fat content 3.80±0.12%. It is recommended therefore, that furthers research work should be done using higher dosage of the extract to test the anti-diabetic activity of the extract.

Conclusions

From the present studies of the analysis on the medicinal potential of corn beared, it can be concluded that oral application of the extract produces significant antidiabetic effect in controlling the blood glucose level and body weight., together with other analysis: phytochemical screening, profile urination test, elemental analysis and the protein constituents. Moreover, it can be ascertained that the corn beard hot water extract can be considered as a potent source of anti-diabetic agents which may be due to the presence of flavonoid alkaloids, tannins and saponin present

in the extract. and its high fiber content from source. The result observed is similar to the report from Alisa *et al*, 2014)" on kuding leaves extract that was recommended for weight reduction measure. Therefore, the use of corn bear hot water extract is recommended for curing diabetes patience together with other prescription by the physicians.

References

1. Adeyeye EI, Fagbohun ED. Proximate Mineral and phytate profiles of some selected spices found in Nigeria. Pakistan Journal of science and Industrial Research. 2005; 48(1):14-22.
2. AOAC. Official Method of Analysis 14th edition. Association of official analytical chemist Washington DC, 1995, 3231-3524.
3. Edeoga HO, Okwu DE, Mbaebie BO. Phytochemical constituent of some Nigrian medicinal plants. African journal of Biotechnology. 2005; 4(2):685-688.
4. Ezeokonkwo E. Effect of method of preparation on the nutritional value of Monmordica mystidica seeds (Arican Nutmeg), 2014, 135-139.
5. Finch RG, Williams RI. Antibiotics resistance, Bailieres infectious Diseases London, Bailliere Tindall, 1999.
6. FAO. Maize in human Nutrition, Food and Agriculture Organisation of the United Nation Rome, 1992.
7. George D, Paploma Roger MD. Encyclopedia of medicinal plant, Education and Health library. E–28770 colmenar spain, 2005, 843-872.
8. Grandy SM. Dietry fat in Ziegler E E and filer by Jr(eds) present knowledge in nutrition 7th edn. Washington D C ILSL press, 1996, 44-57.
9. Harbone JB. Phytochemical methods. Publication. Chapman and Hal. London, 1973, 8-13.
10. Ihekoronye AI, Ngoddy PO. Integrated Food Science and Technology for the tropics, Macmillan publisher London, 1985, 121-134.
11. Miracle MP. Increasing efficiency in maize production in tropical Africa. Text book. Longman London, 1972, 233.
12. Mackie, Mc Carteney C. Practical medicinal microbiology 3rd eddtion. Vol. 2 church hill living stone. Pub. London New York, 1989, 100-491.
13. Mann A, Gbate M, Nda-Uman. Medicinal and economic plant of Nupeland, Bida Niger State Nigeria Jube Evan Books and Publications, 2003, 276.
14. Marles RJ, Fansworth NR. Antidiabetic plants and their active constituents. Phytomedicine. 1995; 2:133-189.
15. Oblana AT, Fagemisin JM. Methodology for improving maize varieties (Zea maize) in Nig. Paper presented at the 3rd National seed improvement course August 15th ------ September 16th. Moor plantation Ibadan, 1997.
16. Oyenuga VA. Nigeria foods and feeding stuff, their chemistry and nutritional value. Ibadan University press Nig, 1968.
17. Sakikadi AV, Georgiou CA, Haroutounian SA. A standard addition method to assay the concentration of Biologically interesting polyphenol in grape berries by revised – phase NPLC molecule. 2007; 12:2259-2269.
18. Nagappa AN, Thakordesai PA, Singh J. Antidiabetic activity of Terminalia catappal linn fruits. Journal of Ethnopharmocology. 2003; 88:45-50.
19. Sani AA, Alemika TEK, Sikirat AS. Isolation and characterisation of cupressuflavone from the leaves of Lophira lanceolata. Journal of pharmacy and Bioresources. 2010; 7:14.
20. Kumar GSPM, Nda–Umar A. Medicinal and Economic plants in Nupeland. Bida Niger State, Nugeria Jube – Evans Book and Publications, 2003, 276.
21. Pari L, Venkateswaran S. Effect of an aqueous extract of phaseolus vulgaris on the collagen properties of tail tendon collagen of rats with streptozotocin induce diabetes Brazillian journal of Medical and Biological Research. 2003; 36:861-870.
22. Shera Bako S, Rosemary I, Uchegbu I. Nutritional and phytochemical composition of leaves of Mormordica balsamina (L I NN) used in herbal medicine in Northern Nigeria. Book of proceeding 37th international conference of Chemical society of Nig, 2014, 177-179.
23. Torel JB, Scontial S, Blue ZQ, Lagis MV. Inhibition of lipids peroxydation of flavonoid sugar oxide amines hydroxyl ion. BD A 1. 1986; 159:38-41.
24. Uzuma Danlumi IR. Phytochemical screening, proximate analysis and antioxidant activities of ripe and unripe plantain powder (Musa paradisiacal) and (Musa accuminata), 2014, 68-71.
25. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes estimates for the year 2000 and projection for 2030 Diabetes care. 2004; 27:1047-1053.
26. Yoshimira M, Takahashi H, Nakanish T. Role of Sodium, Potassium, Calcium, Magnessium and blood pressure regulation Antihypertensiive dietary therapy. Journal of Nutrition. 1991; 49:53-62.