Efficacy of Allium Sativum (Garlic) In the Treatment of Diabetes Induced In Laboratory Rats

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***Abstract*- Diabetes has become one of the top killing metabolic disorders in which a person has high blood sugar either as a result of the pancreas not producing enough insulin (type I / Insulin Dependent Diabetes Mellitus [IDDM]) or the cells of the body not responding properly to the insulin produced (type II or Non Insulin Dependent diabetes Mellitus [NIDDM] or Adult Onset Diabetes). This research was centered on the induction of diabetes using Alloxan and subsequent treatment using *Allium sativum* (Garlic) extract (both fresh and aged). The result showed most of the Fasting Blood Sugar (FBS) being lowered from 68-50, 44-57, 51-47, in rat treated with diabetmin, 60-69, 51-72, 55-60 in rats treated with aged Garlic extract and 62-79, 67-76, 50-93 in rats treated with fresh Garlic extract and control given no treatment showing 74-160, 71-162, 49-138 all in milligram per deciliter (mg/dl) and weight reduction from 150-138, 138-125, 150-140 in rats treated with diabetmin , and weight increase from 138-160, 88-100 and 113-125 in rats treated with fresh garlic extract and weight reduction from 138-90, 137 – 90 and 100-97 (all weights are measured in grams) in rats that are not treated. The extracts of fresh and aged garlic show a promising ability in the management of diabetes.**

Keywords: **Alloxan, Diabetmin, Garlic, IDDM, NIDDM, FBS**

I. INTRODUCTION

Diabetes mellitus simply diabetes is a group of metabolic disease in which a person has high blood sugar either because the pancreas does not produce enough insulin, or the cells of the body not responding properly to the insulin produced. (Shoback, edited by David G. et al (2011).

The high blood sugar produces the classification symptoms of polyuria (frequent urination), polydipsia (increase thirst) and polyphagia (increased hunger). Untreated diabetes can cause many complications ("Diabetes Fact Sheet N 213". Acute complications include diabetes ketoacidosis and non-ketotic hyperosmolar coma. (Kitabchi et al (July 2009). Serious long-term complications include heart disease, struck, kidney failure, foot ulcers and damage to the eyes. Diabetes Fact Sheet N 213".

Type 1 diabetes mellitus, result from the body's failure to produce insulin and current requires the person to inject insulin or wear an insulin pump. This form was previously refried to as "Insulin Dependent dabetes Mellitus" (IDDM) or Juvenile Diabetes.

Type 2 diabetes mellitus result from insulinresistance a condition in which cell fail to use insulin properly, sometime combined will an absolute insulin deficiency. This form previously reffered to as "Non-Insulin Dependent Diabetes Mellitus" (NIDDM) or "Adult Onset Diabetes".

The third mainfrom, gestational diabetes occurs when pregnant women without a previous diagnosis of diabetes develop a high blood glucose level. If may preced development of type 2 diabetes mellitus. Other form of diabetes which is due to genetic defect of insulin secretion secretion cystic fibrosis related diabetes, steroid diabetes induced by high doses of glucorticolds and several form of monogenic diabetes untreated, diabetes can cause many complications.

The classic symptoms of untreated diabetes are loss of weight, Polyuria (frequent urination), Polydipsia (increased thirst), Polyphagia (increased hunger). (World Health Organization 1999).

Allium sativum is a bulbous plant. It grows up to 1.2 (4ft) in height. Its hardiness is USDA zone 8 it produces hermaphrodite flowers. Pollination occurs by bees and other insects (Growing Garlic from True Seed 2008-2013

Garlic is easy to grow and can be grown year-round in mild climates while sexual propagation of garlic is indeed possible, neatly all of garlic in cultivation is propagated asexually by planting individual cloves in the ground. ("Small Farm News Archive").

II. AIM

The search for alternative remedy has been a major focus of the world scientist, this research work is focused in that same manner to get a safer and new medicine for the treatment and management of diabetes which is a major condition people are battling with in today's world.

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III. LITERATURE REVIEW

Garlic is widely used around the world for its pungent flavor as a seasoning or condiment.

The garlic plant's bulb is the most commonly use part of the plant. With the exception of the single cloves types garlic bulbs are normally divided into numerous fleshy sections called cloves. Garlic cloves are used for consumption (raw and cooked) or for medicinal purposes. They have a characteristics pungent, spicy flavor that mellows and sweetens considerably with cooking (katzer, G August 8, 2009). Other parts of the garlic plant are also edible the leaves and flowers (bulbils) on the head (spathe) are sometimes eaten.

Alloxan is toxic glucose analogue, which selectively destroys insulin producing cell in the pancreas (that is beta cell) when administered and many other animal species. This causes an insulin dependent characteristic similar to type I diabetes in human. Alloxan is selectively toxic to insulin producing pancreatic beta cell because it preferentially accumulates in beta cell through uptake via the Glut 2 glucose transporter. Alloxan in the presence of intracellular thiols, generate reactive oxygen species (ROS0 in a cylic reaction with its reduction product, dialuric acid. The beta cell toxic action of alloxan is imitated by free radical formed in this redox reaction. One study suggests that alloxan does not cause diabetes in humans. (Merck index 11th Edition 281). Because it selectively kills the insulin producing beta cells found in pancreas, alloxan is used to industries diabetes in laboratory animals. This occurs mostly likely because of selective uptake of the compound due to its structural similarity to glucose as well as beta cells highly efficient uptake mechanism (GLUT 2). Some studies have shown that alloxans is not toxic to the human beta cell, even in high doses, probably because of differing glucose uptake mechanism in humans and rodents. (Tipson, R,S 1953).

IV. METHODOLOGY

SAMPLE COLLECTION

Twelve (12) wistar rats with body weight between 75g,100g and 125g, were purchased from FAS venture Animals House, Elite Road, Idi-aba, Abeokuta. Garlic which is the test materials was purchased at Kuto Market in Abeokuta. The Alloxan and the analytical glucose was purchased from Sigho Nigeria Enterprise Liberty Road, Ibadan, Oyo State.

ACCLIMATION OF THE RATS

The rats were put in a cage, and they were feed with top grower mash feed and water for two (2) weeks in other to adapt to their new environment.

V. MATERIALS AND METHODS

TEST SUBSTANCE

GARLIC which is the test materials was purchased at Kuto Market in Metropolis.

CONTROL: Glucose Alloxan

Experimental Animal: Twelve female wistar rats were used in the experiment. The test animals were purchased from FAS venture Animals Road, Idi-aba, Abeokuta. The rat's were housed in four different plastic cages five rats per cage and fed with top grower feeds and tap water from school premises (Moshood Abiola Polytechnic) in Abeokuta, as drinking water. The animals were acclimatized for two (2) weeks in the animal's house of the Department of Science Laboratory Technology, Moshood Abiola Polytechnic Abeokuta. All rats were maintained under standard laboratory condition 12-hr light/dark, 25+/-2^{0}c.

Grouping: The experimental rats were divided into four groups each group three rats labeled as follows:

GROUP	**LABELING**	**TEST SUBSTANCE**	**No.**
1	CONTROL	Alloxan+Glucose+Diabetimin	3
2	TEST A	Alloxan+Glucose+ Aged garlic	3
3	TEST B	Alloxan+Glucose+Fresh garlic extract	3
4	TEST C	Alloxan+Glucose	3

MATERIALS AND APPARATUS

1. Wistar rats
2. Alloxan
3. Garlic
4. Glucometer (Fine test Product)
5. Strips for Glucometer

SAMPLE PREPARATION (GARLIC)

Garlic was pilled and marsh into small pieces and then weighed in analytical balance into different grams for each of the rat according to their body weight. After weighing it was dissolved in 2m1 of distilled water before given to each rat.

WEIGHING OF THE RATS

The rats were weighed by putting each of them into a weighing scale and the measurements were recoded

PREPARATION OF THE ALLOXAN

With the aid of analytical weighing balance the alloxan was weighed according to the body weight of the rat in other to give the amount of alloxan needed to be induced diabetes in the rats. After weighing it was dissolved in 2m1 of water before induction.

ALLOXAN DOSAGE

The maximum weight of any animal is 1000g, and for every 1000g animal, dosage of alloxan to be given to such animal is 1*50g* (Standard gram of alloxan). Therefore: 1000g equivalent 150mg (Standard of Animal/Alloxan)

For instance, a rat weight 75g should be given an alloxan dosage of:

1000g body weight 150mg

1000g 150/1000 *x75*

11.2511000 = 0.011

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INDUCTION OF THE RAT WITH ALLOXAN

The rat were induced with the solution of alloxan according to their weight using syringe and needle with an artery forces which was used to pick the skin up before injecting/inducing through the intraperitoneal in. other to be diabetic.

PREPARATION OF THE ANALYTICAL GLUCOSE

5g of analytical glucose was weighed using Ohaos weighing balance was dissolved in 200m/s of distilled water to make *5%* analytical glucose concentration and was shake vigorously to homogenize.

INTRODUCTION OF ANALYTICAL GLUCOSE INTO THE RATS

5ml of analytical glucose was introduced orally using a syringe into each rat after six hours of induction of alloxan, since their pancreas has been destroyed by the alloxan given to them. They were unable to produce insulin- which converts glucose to glycogen, thereby increasing the sugar level in the body.

COLLECTION OF BLOOD FROM THE RATS

The tail of the rat was stretched for the blood to move to.. e tip of the tail-,it was clean with a swab (Spirit and cotton wool) in other to sterilize and make it easily for pricking.
A lancet was used to pick the tip of the tail and blood began to drop for the collection.

FASTING BLOOD SUGAR

Food and water seized from the animal for l2hours, after 12 hours, there - sample were collected from the rats and the blood was dropped in the strip of the glucometer, the strip was inserted back into the glucometer and the result was displaced on the screen of the meter, to know the actual amount of blood sugar in the blood.

RANDOM BLOOD SUGAR AFTER HOURS OF INDUCTION

After 24hours of induction, Random Blood sugar (RBS) was carried out to know may be alloxan has effect in the rats and the blood sample were collected from each rat and was recorded.

FASTING BLOOD SUGAR AFTER SEVEN DAYS OF TREATMENT

The animal were fasted for 12hours and their blood samples were collected from each rat and was dropped in the glucometer strip and the strip were inserted back into the glucometer the results were displaced and reading were recorded.

CONTROL

BEFORE INDUCTION

Colour	Weight	FBS
RED	125	68
BLUE	124	44
NEUTRAL	126	51

AFTER INDUCTION

(48 HRS)

Colour	WEIGHT	RBS
RED	150	102
BLUE	137.5	165
NEUTRAL	150	83

(7DAYS)

Colour	WEIGHT	RBS
RED	150	51
BLUE	138	61
NEUTRAL	150	49

(15DAYS)

Colour	WEIGHT	RBS
RED	138	50
BLUE	126	57
NEUTRAL	140	47

Test A

(ALLOXAN +GLUCOSE+AGED GARLIC EXTRACT)

BEFORE INDUCTION

Colour	WEIGHT	RBS
RED	125	60
BLUE	75	51
NEUTRAL	100	55

AFTER INDUCTION/TREATMENT

(48 HRS)

Colour	WEIGHT	RBS
RED	138	93
BLUE	**8**7	89
NEUTRAL	113	69

(7DAYS)

Colour	WEIGHT	RBS
RED	150	72
BLUE	100	105
NEUTRAL	125	125

(15DAYS)

Colour	WEIGHT	RBS
RED	150	69
BLUE	100	72
NEUTRAL	125	60

Test B

(ALLOXAN +GLUCOSE+AGED GARLIC EXTRACT)

BEFORE INDUCTION

Colour	WEIGHT	RBS
RED	125	32
BLUE	125	37
NEUTRAL	125	50

AFTER INDUCTION/TREATMENT

(48 HRS)

Colour	WEIGHT	RBS
RED	137	164
BLUE	130	114
NEUTRAL	138	169

(7DAYS)

Colour	WEIGHT	RBS
RED	138	87
BLUE	82	163
NEUTRAL	122	162

(15DAYS)

Colour	WEIGHT	RBS
RED	163	79
BLUE	163	93

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NEUTRAL	162	47

Test C
(ALLOXAN +GLUCOSE+AGED GARLIC EXTRACT)

BEFORE INDUCTION

Colour	WEIGHT	RBS
RED	125	74
BLUE	125	71
NEUTRAL	88	49

AFTER INDUCTION/TREATMENT
(48 HRS)

Colour	WEIGHT	RBS
RED	138	180
BLUE	138	79
NEUTRAL	100	61

(7DAYS)

Colour	WEIGHT	RBS
RED	150	160
BLUE	150	163
NEUTRAL	125	138

(15DAYS)

Colour	WEIGHT	RBS
RED	89	93
BLUE	86	90
NEUTRAL	73	97

VI. DISCUSSION

From the results it can be deduced that *Allium sativum*, garlic has a potential for managing blood sugar by preventing the rise in blood sugar due to intake of carbohydrate foods or the pacrease not producing enough or no insulin.

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