Available Online through
www.ijpbs.com (or) www.ijpbsonline.com

IJPBS |Volume 5| Issue 1|JAN-MAR|2015|96-99

Research Article
Biological Sciences

EFFECT OF POTASSIUM IODIDE ON GLUCOSE, CHOLESTEROL AND TRIGLYCERIDES LEVELS IN GLUCOSE LOADED RATS

Rehab El nour Omer [a], Omer Musa Izz eldin [a] and Reem Hassan Ahmed [b]

[a]Biochemistry Department- Faculty of Science and Technology- Omdurman Islamic University- Sudan

[b]Department of Pharmacology and Toxicology-Medicinal and Aromatic Plants Research Institute- National Center for Research- Sudan

*Corresponding Author Email: reemha2011@gmail.com

ABSTRACT

The main objective of this study is to evaluate the hypoglycemic effect of Potassium iodide (KI) on induced hyperglycemic rats. Two groups of rats were administered with 0.2mg/kg KI and 0.8mg/kg of KI.A standard group administered was with 10mg/kg of hypoglycemic drug glibenclamide respectively for 2 consecutive weeks. The control group was given distilled water only. After the two weeks' time, the four groups were subjected to a glucose tolerance test and measurement of plasma cholesterol and triglyceride levels. The two doses of KI (0.2 and 0.8 mg/kg) presented a hypoglycemic effect significant at $P < 0.05$ in the plasma glucose level of hyperglycemic rats after two hours of glucose load compared to control and standard groups. After two weeks of treatment, the two doses of KI caused a decrease in the cholesterol and triglycerides levels compared with levels before treatment.

KEY WORDS

Iodine, hypoglycemic, experimental, animals

INTRODUCTION

Diabetes is a disease of great concern among scientists that usually arises either because of inefficient insulin secretion or for reasons of lack of insulin or other circumstances which influence the metabolism of sugars, fats and proteins.

The levels of glucose in the blood are regulated by the hormones insulin and glucagon from the pancreas, and T3 and T4 from the thyroid.

The basal metabolic rate of the body is controlled by the hormones T3 and T4 produced by the thyroid gland in response to the thyroid stimulating hormone (TSH) produced by the anterior pituitary. T3and T4 bind to receptors on the mitochondria causing an increase in the production of ATP as well as increase in the transcription of genes that help utilize glucose metabolism of the cell [1].

Adequate iodide intake is necessary for normal thyroid hormone synthesis as thyroid hormones are the only substances in the body that have iodine in their structure. The major sources of dietary iodide are iodated bread, iodized salt and dairy products. Individual may also be exposed to iodide in medication, disinfectant, and radiographic contrast agents [2].This study was carried out to evaluate the effectiveness of increased doses of iodine the degradation of carbohydrate, lipids and on its decreasing effect on glucose, cholesterol and triglycerides levels.

MATERIALS & METHODS

Adult Wister albino rats of either sex weighting (160-280) grams obtained from the Animal House of Veterinary Research Center- Sudan. All rats were fed a standard diet composed of vegetable, meat, oil, and wheat flour. Thirty rats allocated in to four groups with six rats each and divided as follows:

Group (1): served as normal control and received distilled water.

Group (2): served as standards group and treated with glibenclamide, (10 mg / kg body weight).

Group (3): was treated with low dose of KI (0.2mg\kg).

Group (4): was treated with high dose of KI (0.8mg\kg).

The experiment continued for two consecutive weeks.

All groups were subjected to fasting for 18 hours prior to experimentation and the plasma glucose level was determined (zero reading). The four groups were administered intraperitonially with 2 g/kg body weight of 50 % glucose solution. Plasma glucose level was monitored in the four groups at 2two and four hours after the glucose load. The cholesterol and Triglyceride levels were also measured and the levels were compared with those before treatment. The Plasma glucose, cholesterol and triglycerides levels were measured [3, 4, 5]

RESULTS & DISCUSSION

Administration of two doses of KI (0.2 and 0.8 mg/kg) were found to present a hypoglycemic effect on glucose loaded rats (Table [1]). A significant reduction of blood glucose level was seen in the group administered with the high dose of KI at ($p \leq 0.001$) when compared with the control group that was given distilled water only Also it was observed that the decrease in high dose was more prominent than that caused by the low dose of iodine. That significant difference was shown after 2hours of glucose load.

This result agreed with a previous study conducted [6] who stated that the glucose concentration was decreased by KI supplementation for 8 weeks, and the daily supplementation of KI improved the insulin sensitivity and caused a decrease in glucose concentration in goats, significant at $P \leq 0.05$. Another previous study stated that, skin pre-treatment with iodine followed by dermal application of insulin results in reduced glucose and elevated insulin levels in the plasma [7] and this agreed with the findings in the present study.

The effect of increased doses of KI on the plasma cholesterol and triglycerides level on induced hyperglycemic rats was presented in Tables [2] and [3]. No significant difference was seen in the effect of administration of high dose of KI although the low dose of KI presented significant difference after 2 weeks ($p<0.001$) of treatment when compared with the cholesterol level before treatment. These results resembled the results of a previous study conducted and stated that administration of mice with drinking water containing different levels of iodine [8]. That study revealed that high dose of iodine caused a hypercholesterolemic effect. The two doses of KI (high & low) did not present a significant difference on the triglyceride level when compared with start point but it was observed that there was a reduction in the triglyceride level caused by high dose KI more than low dose. Hence, iodine as it plays an important role in the regulation of thyroid hormones could have a beneficial efficacy on the regulation of glucose, cholesterol and triglycerides metabolism.

Table [1]: The effect of Potassium iodide on Plasma Glucose level of induced hyperglycemic rats

Groups	Plasma glucose level (before G.T.T) (mg/dl)	Plasma glucose 0 time (mg/dl)	Plasma glucose level 2 hours after glucose load (mg/dl)	Plasma glucose level 4 hours after glucose load (mg/dl)
		After 2 weeks of treatment & after Glucose Load		
Standard drug: glibenclamid(10mg/kg)	86.6 ± 3.18	89.8 ± 4.78	91.4 ± 4.41**	112.6 ± 2.42*
Control: distilled water(10mg/kg)	94.00 ± 1.5	94.60 ± 1.12	204.40 ± 1.9	132.80 ± 3.07
Group(1): KI(0.2mg/day in drinking water)	100.60 ± 3.010	70.00 ± 3.11*	135.20 ± 4.913**	127.40 ± 8.518*
Group(2): KI(0.8mg/day in drinking water)	92.00 ± 4.472	84.00 ± 9.121	133.20 ± 6.312**	127.00 ± 6.395 *
Group(3): Radish ext (250mg/ kg)	98.60 ± 2.731	81.20 ± 2.04*	107.40 ± 4.697**	94.60 ± 4.523*
Group(4): Radish ext (250mg/ kg +0.8mg KI)	92.00 ± 4.909	73.80 ± 3.92*	101.40 ± 3.356**	110.00 ± 8.136*

(Data are expressed in mean± standard error of mean)

*** = (P<0.05) ;** = (P<0.001)**

Table [2]: The effect of increased doses of iodine on plasma cholesterol level in induced hyperglycemic rats

Dose	plasma cholesterol level (mg/dl)	
(Groups)	start	2weeks
Group (1):KI (0.2 mg/day in drinking water)	75.8 ± 2.8	40 ± 3.16**
Group (2): KI (0.8mg day in drinking water)	71.8 ± 3.93	37 ± 4.41

**** = (P≤0.001)**

Table [3]: The effect of increased doses of iodine on plasma triglyceride level in induced hyperglycemic rat

	plasma triglyceride level (mg/dl)	
(Groups)	Start reading	After 2Weeks
Group (1):KI (0.2 mg/day in drinking water)	75.4 ±3.54	38 ± 0.93
Group (2): KI (0.8mg day in drinking water)	72 ± 4.6	29.4 ± 4.11

CONCLUSION

Administration of increased doses of KI (0.2 and 0.8 mg) for two consecutive weeks, have presented a significant hypoglycemic effect on glucose loaded hyperglycemic rats. These two doses of iodine caused a beneficial effect on the reduction of plasma cholesterol and triglyceride levels after two weeks of treatment which considered an important hint in the regulation of glucose metabolism and lipid profile of hyperglycemic subjects.

REFERENCES

[1] Belk C., Borden V.: Human Biology , science for life 4th edition, Benjamin cummings (2008).

[2] James E., Griffin, Sergior R. , Ojeda:Text book of endocrine physiology (5th ed.), Oxford University press, Inc .p. 294 (2004)

[3] Trinder P. : Determination of glucose in blood using glucose oxidase with an alternative oxygen acceptor .Ann Clin Biochem, 6:24-27 (1969).

[4] Richmond W.:Preparation and properties of a cholesterol oxidase from Nocardia sp. And it's application to the enzymatic assay of total cholestrolin serum. Clin chem, 19(12):1350-6 (1973).

[5] Fossati P., Prencipe L.: Serum triglycerides determined colorimetric ally with enzyme that produces hydrogen peroxide. Clin Chem.28:2077-2080 (1982).

[6] Nudda A., Battacone G., Bomboi G., Floris B., Decandia M., Pulina G.: Effect of dietary iodine on thyroid hormones and energy blood metabolites in lactating goats. Animal .7 (1):60-5 Epub2012.May24:1-6 (2013).

[7] Sintov A C, Wormser U. Topical iodine facilitates transdermal delivery of insulin. J Control Release. 118 (2): 185- 8 (2007)

[8] Zhao LN, Xu J, Peng XL, Tian LY, Hao LP, Yang XF, Ying CJ, Sun XF. Dose and time- dependant hypercholesterolemic effects of iodine excess via TR beta 1-mediated down regulation of hepatic LDLr gene expression. Eur J Nutr. 49 (5): 257-65 (2007)

.

*Corresponding Author:
reemha2011@gmail.com