



Study of Hypoglycemic activity of the Rhizomes of Rheum ribes (Rhubarb) in normal and Alloxan Diabetic Rabbits

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ABSTRACT

Blood glucose levels of the normal and alloxan- diabetic male albino rabbits were determined after oral administration of various doses of powdered Rheum ribes rhizomes (Very bitter). It was considered as an effective antidiabetic agent for many decades. In normal rabbit 2gm/kg dose caused decrease in blood glucose. The effect was maximum at a 12 hours intervals, after which it was gradually decreased. The 4 and 6 gm/kg doses also lowered the level of blood glucose of these rabbits. In diabetic rabbits, the 2gm/kg dose did not cause a significant decreased in blood glucose. However 4 and 6 gm/kg doses produced a dose dependent decreases in blood glucose levels .Up to date (1999) reviews of literature showed no new works in this field.

INTRODUCTION

It was documented that the rhubarb root has a purgative action for the use in the treatment of constipation (1), but nothing has been documented about the action of the root on blood sugar level. The rhizomes of Rheum ribes were used by mountaineers for treatment of diabetes in Iraqi Kurdistan, After a literature review up to 1999 on the rhizomes of Rheum ribes nothing has been found about its effect on blood sugar level.

The present investigation were undertaken to study the effect of Rhubarb rhizomes powder on blood glucose levels following oral administration to normoglycaemic and alloxan treated hyperglycemic male albino rabbits, in order to confirm their activities.

EXPERIMENTAL

Materials and Methods

100 gm of Rheum ribes rhizomes were collected from Erbil city in Kurdistan province, IRAQ, washed with tap water, dried,

milled in an electric grinder and the powder stored in closed cellophane bags at 4°C in a refrigerator.

Chemicals used

Alloxan- monophdrate, and alpha-D-glucose (anhydrous) were obtained from B.D.H. Glacial acetic acid, o-toluidine, and trichloroacetic acid was obtained from Merck.

Animals used

Male, adult, healthy albino rabbits of local strain weighing between 1000- 1500 gm were used in these experiments. The animals were kept in air- conditioned animal room. The animals were offered a balanced rabbit feed and allowed tap water ad libitum. The effects of rhizomes powder were studied on blood glucose on the normally fed (non- fasted) rabbits. In addition, separate experiments were performed to study the effects on blood glucose of the non- fasted alloxan- treated diabetic rabbits.

Preparation of Diabetic Rabbits:

A group of rabbits weighing 1000- 1500 gm were made diabetic by injecting intravenously 150 mg/kg body weight of alloxan- monohydrate⁽²⁾.

Eight days after injection, the blood glucose Levels of all surviving rabbits were determined by the O- toluidine method of Fings etal⁽³⁾. Rabbits with glucose level of (200- 500) mg/100 ml were considered as diabetic.

Grouping of Rabbits:

Rabbits were randomly divided in 8 groups of six animals each group. Group I served as control and received orally 15ml of 1% carboxy- methylcellulose (CMC) suspension only. The animals of group 2,3,4 were treated orally with 2,4,6 gm/kg weight of rhizomes powder suspended in 1% of CMC - solution. Animal groups of 5,6,7 were alloxan diabetic, they received orally in 1% CMC - Solution, 2,4,6 gm/kg body weight of rhizome powder per kg body weight.

Collection of blood

The animal was held in a holder and immediately 0.2 ml of blood was collected from an ear vein. Similar samples were collected at 4,12,24 hour time intervals.

Determiation of Blood Glucose

Blood glucose was determined by the method of Fings etal⁽³⁾ using the o-toluidine reagent. This method gives result close to those obtained by glucose oxidase method. In addition, the o-toluidine method is one of the most widely used manual methods.

Statistical Analysis

Mean blood glucose levels were expressed in mg100ml as SEM in all experiments and student t test was used to check their significance⁽⁴⁾.

RESULTS

Standard curve for Glucose Determination was linear up to 300mg/100 ml and blood glucose levels of the samples found to be above 300mg/100 ml were re-determined after dilution. The effect of Alloxan administration to rabbits has been described in detail by Akhtar etal⁽⁵⁾. The rabbits with blood glucose

levels above 200mg percent were considered diabetic and were used in the studies. Such hyperglycemic rabbits have already been employed by Akhtar etal⁽⁵⁾. Marquis etal⁽⁶⁾ and Shani etal⁽⁷⁾. The effect of rhizomes of *R. ribes* on blood glucose in normal rabbits is shown in figure 1.

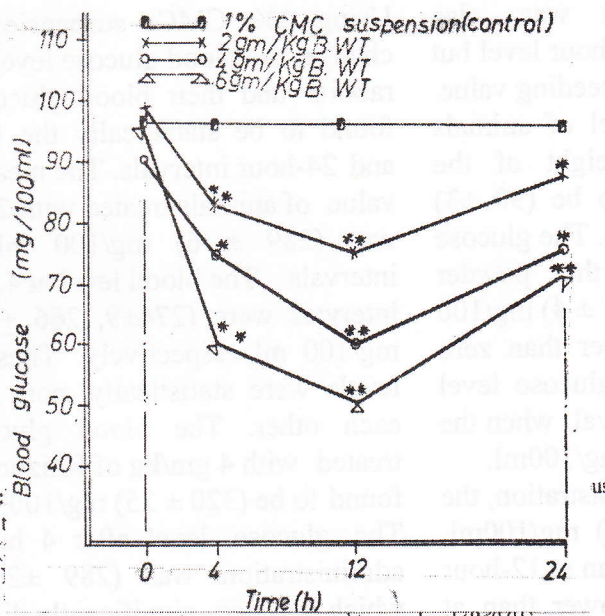


Fig.1: Blood glucose levels of normal rabbits expressed in mg/100 ml at Various time intervals after oral administration of powdered rhizome of *R-ribes* (2, 4 and 6 gm/kg body weight).

Ns: Non-Significant as Compared to zero level.($P > 0.05$).

*: Significant decrease as compared to zero level ($P < 0.05$)

** : High Significant decrease as compared to zero level ($P < 0.01$).

(235 ±12) mg/100 ml, which is significantly lower than at zero level

This lowering level caused by the powder continued at 12-hour interval, when the glucose level was found to be (186 ± 14) mg/100 ml. This level of blood glucose is also significantly lower than 4-hour interval. The

blood glucose level at 24 hour was (215 ± 12) mg /100 ml which was statistically higher than at 12 hour interval but still significantly lower than at zero hour.

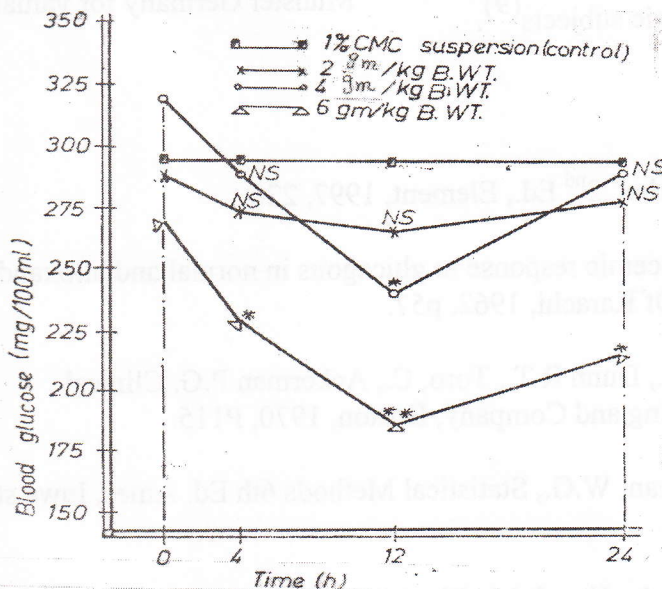


Fig.2: Blood Glucose levels of Diabetic rabbits in mg/100 ml at various time intervals after oral administration rhizome of R. ribes (2,4 and 6 gm/kg body weight)

Ns. Non-Significant as Compared to zero level. (P>0.005).

*: Significant decrease as compared to zero level (P<0.05).

* *: High Significant decrease as compared to zero level (P<0.01).

DISCUSSION

It is clear from the data obtained, that the administration of various doses of powder gained from Rhizomes of R. ribes caused a decrease in blood glucose level of normal and alloxan- diabetic rabbits. As shown in figure 1

and 2, the whole powder rhizom produced significant and consistent hypoglycemic effect in normal rabbits as well as in animals with chemically induced insulin deficiency. Sulphonylureas including tolbutamide have been reported to produce a hypoglycemic effect in normal animals by stimulating

pancreatic beta- cells to release more insulin into the blood stream and by increasing the deposition in the liver.

These drugs however, do not decrease blood glucose level in alloxan-diabetic animals⁽⁸⁾. In Contrast to the oral antidiabetic agents the exogenous administration of insulin is well known to produce hypoglycemic in both normal and alloxan- diabetic subjects⁽⁹⁾.

It is, therefore conceivable that hypoglycemic principles in the rhizome of *R. ribes* exert a direct effect in the diabetic- rabbits probably by a mechanism similar to insulin.

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په سه نديکرا له ۲۳/۸/۲۰۰۰ د

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كورتیه

رایزومی رهگی رهکی ریواس (Rhubarb) له کوردستانی عیراقدا، وه به تایبهتی له ناوچه شاخاویی بهکاندا، له لایهن هاوالاتیان وه بهکارده هیئیریت بۆ نزم کردنه وهی شهکری خوین، توئیژینه وه له م بارهیه وه هیشتا بلاو نه کراوته وه.

له م توئیژینه وه یه دا کوتراوی رایزومی ناوبراو له پیگهی دهمه وه درا به و که رویشکانه ی که باری شهکری خوینه که یان ئاسایی یه وه به وانه ش که ماده ی ئه لۆکسان (Alloxan) یان دراوته ی بۆ به رزکردنی شهکری خوینیان. له ههردوو حاله که دا توئیژینه وه که ده ری خست که رایزومی ناوبراو شهکری خوینه که یانی زۆر به باشی نزم کرده و.

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الخلاصة

يستخدم في كوردستان العراق، وبالأخص في المناطق الجبلية رايزوم نبات ال Rhubarb لخفض مستوى السكر في الدم من قبل المواطنين. إن هذا الموضوع غير منشور لحد الآن في المجالات العلمية. لقد تم في هذا البحث دراسة تأثير مطحون هذا الرايزوم Rhizome على أرانب البايانو "Albino Rabbits" وبعد إعطاء هذا المسحوق عن طريق الفم الى أرانب لها سكر دم طبيعي وأرانب تم معاملتها بمادة الالوسكان المؤدي إلى رفع مستوى السكر في الدم - تبين من البحث إن لهذه الريزومات تأثيراً معنوياً على خفض مستوى سكر الدم في الحالتين.