Medical Science, Vol. 20, No. 79, May 1, 2016 RESEARCH

ISSN 2321–7359
EISSN 2321–7367

Medical Science
An International Journal

# Evaluation of *Invitro* Antidiabetic Activity and *Invivo* Oral Glucose Tolerance Test of *Rumex vesicarius*

Nadiminti Satish Reddy*, Vidyasabbani, Pravanthi B, Vishwanath Reddy P, Vijaya B, Ch.Venu

Department of Pharmacology, Vishnu Institute of Pharmaceutical Education and Research, Vishnupur, Narsapur, Medak, Telangana, India

*Corresponding Author: E-mail: satishreddy949@gmail.com

Publication History
Received: 26 February 2016
Accepted: 04 April 2016
Published: 1 May 2016

Citation
Nadiminti Satish Reddy, Vidyasabbani, Pravanthi B, Vishwanath Reddy P, Vijaya B, Ch.Venu. Evaluation of *Invitro* Antidiabetic Activity and *Invivo* Oral Glucose Tolerance Test of *Rumex vesicarius*. *Medical Science*, 2016, 20(79), 112-116

Publication License
This work is licensed under a Creative Commons Attribution 4.0 International License.

General Note
Article is recommended to print in recycled paper.

## ABSTRACT

*Rumex vesicarius* is one of the famous medicinal plants used in the treatment of a large number of human ailments as mentioned in Ayurveda. The main objective of this work is to evaluate the *invitro* antidiabetic activity and *invivo* Oral Glucose Tolerance Test effects of ethanolic extract of *Rumex vesicarius*. Different concentrations of *Rumex vesicarius* extracts were evaluated for alpha glucosidase and glucose uptake in yeast cells inhibition activity. Percentage of alpha glucosidase and glucose uptake in yeast cells inhibitory activity was calculated. In this study ethanolic extraction showed siginificant inhibition activity at the concentration of 400



© 2016 Discovery Publication. All Rights Reserved

µg/ml. In this study we conclude that the crude ethanolic extract of *Rumex vesicarius* is potential source of natural antidiabetic agent.

KEYWORDS: *Rumex vesicarius*, *alpha glucosidase*, glucose uptake in yeast cells, oral glucose tolerance test (OGTT).

## 1. INTRODUCTION

*Rumex vesicarius Linn*. (Polygonaceae) is commonly called as Chukka kura in Telugu, Chukra in Hindi, Bladder Dock in English [1]. *Rumex vesicarius* L. is a wild edible plant used as a sorrel and collected in spring season and eaten fresh or cooked. *Rumex vesicarius* L. has many important medicinal uses such as treatment of hepatic diseases, bad digestion, diuretic, laxative, tonic, analgesic, purgative and antibacterial agents. The plant can be used to reduce biliary disorders and control cholesterol levels [2-7]. The plant contains many bioactive substances such as flavonoids (vitexin, isovitexin, orientin), also contain anthraquinones particularly in roots (emodin and chrysophanol). The plant also contains carotenoids, vitamins (vitamin c), proteins, lipids and organic salts [8-11]. The above mentioned bioactive phytochemicals (polyphenols, flavonoids, carotenoids, tocopherols and ascorbic acid) have a role as antioxidant and detoxifying agents. The intake of antioxidant phytochemicals like carotenoids and flavonoids will protect against non- communicable diseases in human beings such as "cancer, cardiovascular diseases" [12-13]. The present study was designed from a muse to evaluate the *invitro* antidiabetic activity and oral glucose tolerance test on diabetic animals.

## 2. MATERIALS AND METHODS

### *Plant Material:*

*Rumex vesicarius* leaves were collected from Narsapur, Medak district and authenticated by D. Venkateshwara Rao, Deputy Director, AP Forest Academy, Dulapally, Hyderabad, Rangareddy District.

### *Preparation of extracts:*

The collected aerial parts of the plant were washed and dried under the shade. Around 500 g of the coarsely powdered aerial parts of the plant was packed in a soxhlet apparatus and extracted with ethanol.

### *Animals:*

*Albino Wistar rats* (weighing 150-200 g) of both sexes, were procured from National Institute of Nutrition, Hyderabad, India and were housed in standard metal cages. They were provided with food, water *ad libitium* and allowed a one week acclimatization period prior to the study. The protocol was approved by Institutional animal ethical committee of VIPER, Narsapur, Medak and the study was performed according to the CPCSEA guidelines (1358/ac/10/CPCSEA).

### *Glucose uptake in yeast cells*:

Yeast cells were prepared according to the method of yeast cells briefly, commercial baker's yeast was washed by repeated centrifugation (3,000 X g, 5 min) in distilled water until the supernatant fluids were clear and 10 % (v/v) suspension was prepared in distilled water. Various concentrations of extracts (1-5 mg) were added to 1 ml of glucose solution (5, 10, 25 mM) and incubated together for 10 min at 37°. Reaction was started by adding 100 µl of yeast suspension, vortex and further incubated at 37° for 60 min. The tubes were centrifuged (2,500 X g, 5min) and glucose was estimated in the supernatant [14]. The percentage increase in glucose uptake by yeast cells was calculated using the following formula.

$$\text{Increase in glucose uptake (\%)} = \frac{Abs_{control} - Abs_{sample}}{Abs_{control}} \times 100$$

### *In vitro α- glucosidase inhibition study*:

The tissue homogenate prepared from small intestine of rats was used as enzyme source. A small piece of small intestine was taken out in precooled phosphate buffer saline (PBS), thoroughly cleaned, dried on blotting paper, weighed and then homogenized in glass Teflon homogenizer. The homogenate was centrifuged at 5,000 rpm for 30 min and its supernatant was used as enzyme source. Final volume of supernatant was maintained to 20 % (w/v). The spectrophotmetric assay method was used with slight modification [15]. Here, 40 µl tissue homogenate was mixed with (1-9 mg/ml) test, standard, drug vector and incubated for 37°.





© 2016 Discovery Publication. All Rights Reserved

Thereafter, 280 µl maltose (37 mM) was added and further incubated for 30 min. Finally, the reaction was stopped by placing the tubes in boiling water for 10 min. Glucose concentration was assessed using Accu-chek active.

### *Oral Glucose Tolerance test (OGTT) in normal rats:*

The animals from groups 1-5 were fasted for 12 hours. Fasting glycemia was measured and defined as zero time. After this procedure, animals received their treatment orally and after 30 min all groups received an oral load of D- glucose (2 gm/kg bdy wt). Blood glucose levels were measured 5 min before and 30, 60 min after glucose administration [16]. Blood samples were obtained from retro orbital puncture and glucose concentration determined using a blood glucose device monitor (Accu- chek).

## 3. RESULTS AND DISCUSSION

### *Glucose uptake by Yeast cells method:*

It was studied that the glucose uptake rate increased with increase in concentration of plant extract and decreased with increase in extra cellular glucose.

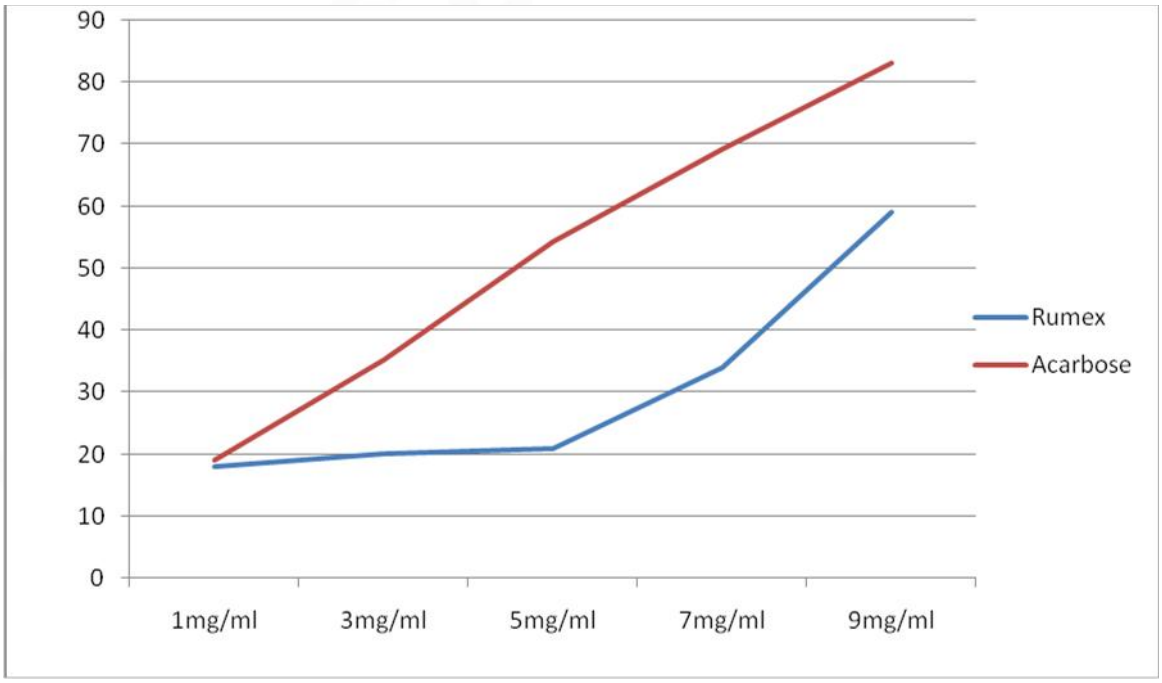
**Table I** Percentage of increase in Glucose uptake in Yeast cells of *Rumex vesicarius*

| TEST SAMPLE | 5mM | 10mM | 25mM |
|---|---|---|---|
| 5 µl | 60.7 % | 56% | 47% |
| 10 µl | 116.2 % | 74.2 % | 60 % |

### *In vitro α-glycosidase inhibition activity:*

*Rumex vesicarius* showed a significant inhibitory action on α-glucosidase enzyme. The percentage inhibition at 1- 9 mg/ml concentrations of *Rumex vesicarius* leaf extract showed a concentration dependent increase in the percentage inhibition. *Rumex* showed 59% inhibition at 9 mg/ml and Acarbose showed 83 % inhibition. The values are tabulated in table II.

**Graph-I** In vitro α-glucosidase inhibition activity








© 2016 Discovery Publication. All Rights Reserved

**Table II** In vitro *α-glucosidase* inhibition of *Rumex vesicarius*

| Plant Extract (mg/ml) | % of inhibition | |
|---|---|---|
| | Rumex extract | Acarbose |
| 1 | 18 | 19.01 |
| 3 | 20 | 35.23 |
| 5 | 21 | 54.22 |
| 7 | 34 | 69.23 |
| 9 | 59 | 83.06 |

### *Oral Glucose Tolerance Test of Rumex vesicarius*

The rats which have received glucose orally were treated with the ethanolic extract of *Rumex* plant and there was decrease in the blood glucose levels when compared to the control rats. This *Rumex vesicarius* significantly helps in decreasing the glucose levels. All the values are tabulated in the table III.

**Table III** Oral Glucose Tolerance Test of *Rumex vesicarius*

| Test Sample | Blood glucose levels before treatment mg/DL | After treatment (30) min | After treatment (60) min |
|---|---|---|---|
| Control | 121 | 166 | 160 |
| Dose 1 (200mg/kg) | 119 | 117 | 99 |
| Dose 2 (400mg/kg) | 126 | 110 | 90 |
| Metformin(500mg/kg) | 130 | 116 | 79 |

## 4. CONCLUSION

The inhibition of alpha glycosidase enzyme and glucose uptake by yeast cells by the *Rumex* plant in the present study provides a strong biochemical basis for the management of diabetes via., the control of glucose absorption and increase of glucose uptake which in turn regulate blood glucose levels . Thus, the results obtained from the present study are useful in determining the mechanism of action of plant extracts for anti-diabetic activity.

## ACKNOWLEDGEMENT

We would like to thank our Chairman and Dr. A. Ramesh, Principal, VIPER, Narsapur, Medak for providing the facilities and also Venkateshwara Rao, Deputy Director, AP Forest Academy, Dulapally, Hyderabad for the botanical identification and collection of the plant.

## REFERENCES

1. Madhavashetty K Dr,Shivaji K, Tulasirao K, Flowering plants of Chittoor district, Andhra Pradesh, India;298.
2. Batanouny, K.H.: Wild medicinal plants in Egypt. Academy of Scientific Research and Technology, Egypt and International Union for Conservation (IUCN), Switzerland; 1999. pp. 166-167.
3. Al-Quran, S.: Ethnopharmacological survey of wild medicinal plants in Showbak, Jordan. Journal of Ethnopharmacology, 2009; 123: 45- 50.
4. Elegami, A.A.; Almagboul, A.Z.; El faith, M.A.O. and El Tohami, M.S.: Sudanese plants used in folkloric medicine: Screening for antibacterial activity. Part X. Fitoterapia 2001; 72: 810-817.





© 2016 Discovery Publication. All Rights Reserved

5. Atiqur Rahman, M.; Mossa, S.J.; Mansour, S.A. and Al- Yahya, M.A.: Medicinal plant diversity inthe flora of Saudi Arabia .1: a report on seven plant families. Fitoterapia 2004; 75: 149-161.
6. Abutbul, S.; Golan, G.; Barzani, O.; Ofir, R. and Zilberg, D.: Screening of desert plants for use against bacterial pathogens in fish. The Israeli Journal of Aquaculture Bamidgeh 2005; 57(2): 71- 80.
7. Lakshmi, C.P.; Chakradhar, R.P.S.; Rao, J.L. and Gopal, N.O.: EPR and IR spectral investigations on some leafy vegetables of Indian origin. Spectrochimica Act Part A 2009; 74: 140-147.
8. Saleh, N.A.M.; El- Hadidi, M.N. and Raafat, A.: Flavonoids and anthraquinones of some Egyptian Rumex species (Polygonaceae). Bichemical systematics and Ecology 1993; 21(2): 301- 303.
9. Al–Rumaih.; May, M.; Al Saad, F.A. and Warsy, A.S.: Seasonal variation in mineral content of different organs development of Rumex vesicarius L.Saudi. Jorunal of Biological Sciences 2002; 9 (1): 69- 78.
10. Alfawaz, M.A.: Chemical composition of hummayd (Rumexvesicarius) grown in Saudi Arabia. Journal of Food Composition and Analysis 2006; 19: 552- 555.
11. Filho, J.M.B.; Alencar, A.A.; Nunes, X.P.; Tomaz, A.C.; Filho, S.J.G.; Petronio, F.A.; Silva, M.S.; Souza, M.F.V. and cunha, E.V.L.: Source of alpha-, beta-, gamma-, delta-, and epsilon - carotenes : A twententieth century reviewe. Brazilian Journal of Pharmacognosy 2008; 18 (1): 135- 154.
12. Rao, B.N.: Bioactive phytochemicals in Indian foods and their potential in health promotion and disease prevention. Asia Pacific Jclin Nutr 2003; 12 (1): 9- 22.
13. Matkowski, A.: Plant invitro culture for the production of antioxidants - A review. Biotechnology Advances 2008; 26: 548- 560.
14. VP Cirillo., Sugartransport in a psychrophilic yeastJ Bacteriol. 84,1963,485–491
15. Sirintorn YA, Wanlaya J, Damrong S, Bunlunara W, Adisakwattana S. Insulin secreting and a-glucosidase inhibitory activity of Coscinium fenestratum and postprandial hyperglycemia in normal and diabetic rats. J Med Plants Res 2009;3:646-51
16. Lima et al., 2012



© 2016 Discovery Publication. All Rights Reserved