

Effect of *Berberis lycium* Royle on Lipid Profile in Alloxan Induced Diabetic Rabbits

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Abstract

Berberis lycium Royle (*B.l.R*) commonly known as Ishkeen (Kashmal and Darbald) is widely used in folk medicines for the treatment of Diabetes mellitus.

Experimental diabetes use to alter the lipid profile. The aim of the present study was to evaluate the effects of *Berberis lycium* root bark on various lipid profiles in alloxan induced diabetic rabbits. Diabetes was induced by single intravenous injection of Alloxan (150 mg/kg). Oral administration of 250mg/kg and 500mg/kg crude powder of *Berberis lycium* root for four weeks resulted in significant reduction in total cholesterol, triglyceride and low density lipids (LDLs) levels.

Berberis lycium treatment increased the levels of high density lipids (HDLs). Furthermore same doses stabilized the weight of diabetic rabbits. Thus our investigation clearly shows that crude powder of *Berberis lycium* Royle has antihyperlipidemic effect.

Key words: *Berberis lycium* Royle; root bark; lipid profile; diabetes.

Introduction

Traditional herbs and plants have been used for the treatment of various diseases, Nadkarni (1954). *Berberis lycium* Royle is traditionally used medicinal plant for treating various diseases including

diabetes mellitus particularly by the local inhabitants of Hamaliya region, (Muhammad *et al.*, 2006). Induced diabetes use to alter the lipid profile in alloxanized diabetic rabbits (Wojtowicz *et al.*, 2004, Maciejewski *et al.*, 2001). The aim of the present study was to evaluate the antihyperlipidemic effects of *Berberis lycium* in alloxan induced diabetic rabbits.

Berberis lycium Royle is a shrub which belongs to family Berberidaceae and is commonly known as Ishkeen (Local name in shina language). It is commonly found in Himalaya region of India and Pakistan (northern areas). Plants of Berberidaceae are having lot of medicinal uses and are included in British and Indian Pharmacopoeias, (Srivatava *et al.*, 2006). One of the species called *Berberis aristata* is reported to be hepatoprotective, (Janbaz *et al.*, 2000). Fruits of *Berberis vulgaris* have anticholinergic and antihistaminic effects, (Shamas *et al.*, 1999). Berbamine is an alkaloid isolated from *Berberis lycium* has hypotensive action, (Khan *et al.*, 1969).

Materials and Methods

Plant material

Berberis lycium cortical part of root was collected in the month of April, 2007 from the shrubs, growing in village Shikyote District Gilgit of Hamaliya region. Plants were identified and authenticated by Dr. Bukhari, Department of Botany (Ex Director) Bahauddin Zakariya University, Multan, Pakistan. The plant root bark was dried in shade and powdered finely with a Chinese herbal grinder.

Biochemical analysis

The serum total Cholesterol, Triglyceride, HDLs and LDLs, were evaluated by enzymatic test kits (Randox).

LDLs level was calculated by using following, (Fridewald *et al.*, 1979)

$LDL = \text{total cholesterol} - HDL - (\text{triglyceride}/5)$.

Animals

Male albino rabbits belonging to the local strain (*Oryctolagus cuniculus*) with average weight 1.21 Kg and a range of 1.0-1.5 Kg were used.

Treatment of Rabbits

All animals were housed at the animal house of Department of Pharmacy Bahauddin Zakariya University Multan. Animals were housed in stainless cages under standard laboratory condition (light period 8.00 A.M. to 8.00 P.M. $21 \pm 2^\circ\text{C}$, relative humidity 55%, green fodder (*Medicago sativa*) and water available ad libitum. Animals received human care. The study protocol was approved by the local ethical committee.

Induction of diabetes and experimental design

Rabbits were divided into three major experimental groups (normal control (a), diabetic control (b) and diabetic with *Berberis lycium* bark powder treatment). Experimental rabbits were further subdivided into two groups (c) Receiving 250 mg/kg body weight (d) 500 mg /kg body weight crude powder of root bark. At the start of the experiment the animals in the later two groups were injected intravenously with 150 mg/kg of 10% alloxan monohydrate (Sigma, USA) dissolved in isotonic saline to induce diabetes, (Wojtowicz *et al.*, 2004). The control group was injected only with the same volume of isotonic saline as the diabetic groups received. Three days after alloxan injection induction of diabetes was confirmed by determining the blood glucose levels (Blood glucose >250 mg/dl).

Effect of Berberis lycium Royle on lipid profile in alloxanized rabbits

Rabbits were treated with 250 mg/kg body weight and 500 mg/kg body weight crude root powder for one month. Blood samples of all groups were taken at 0 day and 30th day and different lipid parameters were studied.

Effect of Berberis lycium Royle on weight of rabbits

To check the effect of *Berberis lycium Royle* on weight of alloxanized rabbits Weight of rabbits was measured at 0 day, 6th day and 30th day in different experimental groups

Statistical Analysis

The data was expressed as mean \pm standard deviation (SD) and analyzed using analysis of variance (ANOVA). ($p < 0.05$) was considered as significant.

Results and Discussion

Hypolipidemic effects

Cholesterol, Triglyceride and LDL values increased significantly ($p < 0.05$) in diabetic rabbits, where as HDL values decreased significantly ($p < 0.05$) in diabetic rabbits. *Berberis lycium* root bark powder treatment decreased the cholesterol, Triglyceride and LDL values and increased HDL values significantly ($P < 0.05$) in diabetic treated rabbits. Lipid profile of normal, diabetic and treated diabetic rabbits is shown in (Table 1).

Table 1: Effect of *Berberis lycium Royle* root bark powder on plasma cholesterol, triglyceride, LDLs and HDLs in alloxan-induced diabetic rabbits for 1 month.

| Group | Total cholesterol (mg/dl) | Triglyceride (mg/dl) | LDLs (mg/dl) | HDLs (mg/dl) |
|-------|------------------------------|-------------------------|-----------------|-----------------|
|-------|------------------------------|-------------------------|-----------------|-----------------|

| | | | | |
|------------------------|----------------|----------------|---------------|---------------|
| Normal ^a | 44.6±4.17 | 53.6±2.80 | 5.88 ±0.12 | 28±3.14 |
| Diabetic ^b | 64.20±2.42 | 123.4±30.7 | 16.92 ±7.6 | 22.6±2.07 |
| Diabetic treated | | | | |
| 250 mg/kg ^c | 51.21±2.88 * b | 60.3 ±5.37** b | 9.55 ±1.59* b | 29.6±2.3 |
| 500 mg/kg ^d | 49.5±2.60** b | 58.2±18.2** b | 7.06±2.93 * b | 30.80±2.28* b |

Values are expressed as Mean ± SD n=5 rabbits in each group a-d shows different groups and esteric indicate significant difference (*P < 0.05;**P < 0.01) compared to group b

Effect on weight of rabbits

A significant decrease (P<0.05; P<0.001) in weights of diabetic rabbits was observed when the weights measured at 0 day, 6th day and 30th day were compared. While weights of treated diabetic rabbits receiving 250 mg/Kg and 500 mg/Kg body weight of *Berberis lycium* root bark powder were stabilized, when the weights of treated diabetic rabbits measured at 6th day and 30th day were compared. Weights of control, diabetic and treated groups are shown in (Table 2).

Table 2: Effect of *Berberis lycium Royle* root bark powder on weight in alloxan induced diabetic rabbits at 0, 6th and 30th day.

| Group | Weight (Kg) | | |
|------------------|-------------|------------------------|-------------------------|
| | At 0 day | At 6 th day | At 30 th day |
| Normal (a) | 1.34±0.32 | 1.32±0.5 | 1.33±0.2 |
| Diabetic (b) | 1.41± 0.8 | 1.23± 0.74* | 1.04±0.65** |
| Diabetic treated | | | |
| 250 mg/Kg (c) | 1.25 ± 0.39 | 1.19±0.45* | 1.19±0.12* |
| 500 mg/Kg (d) | 1.51 ± 0.14 | 1.49±0.98 | 1.43 |

Values are expressed as Mean ± SD n=5 rabbits in each group a-d shows different groups and esteric in the same row indicate significant difference (*P<0.05; **P<0.01) compared to 0 day.

Discussion

In the present study it was observed that crude powder of *Berberis lycium* root has anti-hyperlipidemic effect in alloxanized rabbits. Hypercholesterolemia and hypertriglyceridemia have been reported to occur in alloxan induced diabetic rabbits, (Wojtowicz *et al.* 2004; Maciejewski *et al.* 2001). These effects are in line with present study. *Berberis lycium* Royel root bark powder significantly reduced the total cholesterol and triglyceride and LDL of treated rabbits as compared to untreated diabetic rabbits. Diabetic patients are more prone to atheromatous complications such as ischemic heart disease (Batteridge and Willams, 1997; Way *et al.*, 2001). High-density lipoprotein levels are decreased in diabetic patients that ultimately lead to atheromatous disease, (Rang *et al.*1995). It was found that treatment with *Berberis lycium* root causes an increase in HDL and decrease in LDL levels that probably prevent the diabetic patients from atheromatous disease. Repeated administration of plant root bark powder thus had a beneficial effect on the hyperlipidemia associated with hyperglycemia. *Berberis lycium* is also reported to have antihyperlipidemic effect in normal broilers, (Chand *et al.*2007). Present findings of strong antihyperlipidemic effect in diabetic rabbits are in line with the previous findings. It was also observed that administration of crude powder of roots to alloxanized animals could not reverse the weights of diabetic animals to normal but it stabilized their weights. It was concluded that *Berberis lycium* root bark contains some active constituent that is responsible for its antihyperlipidemic effects in alloxan induced diabetic rabbits.

Conclusion

The study demonstrate that *Berberis lycium royle* root bark powder contained anti hyperlipidemic activity in allaoxanized rabbits it decreased the elevated level of total cholestrole ,Triglycerides, LDL while it significantly increases the HDL level in alloxan-induced diabetic rabbits.

References

1. Batteridge, J. and Willams, J.C.G (eds) 1997. Lipid disorders in diabetes mellitus. Text Book of Diabetes Blackwell Science, London.
2. Chand, N. Durrani, F.R. Qureshi M.S. and Durrani, Z 2007. Role of *Berberis lycium* in Reducing Serum Cholesterol in Broilers. Asian Aust J Anim Sc 4 : 563-568.
3. Fridewald, W.T. Levy, R.I. and Sloane – Stanley, G.H 1979. Estimation of concentration of Low density cholesterol in plasma, without use of preparative ultracentrifuge. Clin.Chem 18: 499-504.
4. Rang, H.P.Dale, M.M. Ritter, J.M. and Moore, P.K. 2003. In Atherosclerosis and lipoprotein metabolism The Text Book of Pharmacology.
5. Janbaz, K.H. and Gilani, A.H. 2000. Preventive and curative effect of Berbarine in hepatotoxic rodents.

Fitoterapia 71: 25-33.

6. Khan, I. Qayum, A. and Qureshi, Z. 1969. Hypotensive action of Berbamine, Life Sci 17: 993-1001.
7. Laakso, M. 1995. Diabetic Epidemiology of diabetic dyslipidemia. Diabetes Rev 3: 408-410.
8. Maciejewski, R. Rucinski, P. Burski, K. and Figura, T. 2001. Changes in glucose, cholesterol and serum lipid fraction levels in experimental diabetes. Ann Univ Mariae Curie Sklodowska 56: 363-368.
9. Muhammad, W. Muhammad, A.U.S. Rizawan, A.O. Iqbal, M. Rabia, A. and Saeed, Y. 2006. Traditional uses of various plants of northern areas. Acta Botanica Yunnanica 28: 535-542.
10. Nadkarni, K.M. 1954. In: Indian Materia medica 2nd ed.. Popular Book Depot, Bombay.
11. Shamas, F. Ahmadiani, A. and Khosrokhavar, R. 1999. Anticholinergic and antihistaminic activity of Berberis fruit. J Ethnopharmacology 64:161-166.
12. Srivatava, S. Vartika, R. Srivatava, M. and Rawat, A. 2006. Environment monitoring and Assessment 116: 315-320.
13. Way, K.J. Kata, I.N. and King, G.L 2001. Protein Kinase C and the development of diabetic vascular complication. Diabet. Med 18: 945-950.
14. Wojtowicz, Z. Wrona, W. Kis, G. Blaszczyk, M. and Solecka, A. 2004. Serum total cholesterol, triglyceride and High density lipoproteins (HDL) levels in rabbit during the course of experimental diabetes. Ann Univ Mariae Curie Sklodowska 59:258-264.