

PE9.33 Effect of Donkey Meat Extract on Streptozotocin (STZ) Induced Diabetes in Rats 224.00

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Abstract—Present study was performed to determine beneficial effect of donkey meat extract supplementation (15 and 30mg/B.W.) on Type I diabetic rat (Streptozotocin (STZ) induced diabetes). Rump muscle of donkey was extracted with boiled water for 3 hrs and supplemented to STZ induced diabetic rats for 6 weeks. Feed intake and water intake of STZ induced diabetic rats were higher than those of normal rats, while no significant difference was found between diabetes group and DME treated group. Also, body weight of STZ-induced diabetic rats was not improved if compare to that of normal rats. However, blood glucose level of 30 mg DME supplemented rats was significantly reduced after 4 weeks supplementation ($p<0.05$) compare to that of STZ induced diabetic rats. Administration of DME did not show any improving effect on serum lipids (HDL-cholesterol, total cholesterol, and triglyceride). Also organ weights of STZ- induced diabetic rats were not influenced by supplementation of DME. From this results, it is indicated that the supplementation of DME with dose 15 and 30mg/B.W. was not effective on Type I diabetic rats with more than 400mg/dl glucose level, even though blood glucose reducing effect was shown 4 weeks later. Donkey meat is not popular in Korea yet some people enjoy its taste and expect medicinal effect. Further study should be necessary to identify nutrition benefit of donkey meat.

Key words: donkey meat, Type I diabetic rats, blood glucose, HDL cholesterol

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INTRODUCTION

Donkey (*Equus asinus*) is one of the domestic animals in many countries. Donkeys can constitute an important source of meat, but in the past the potential of donkey breeding for meat production has received little attention [1]. Recently in many countries of the Mediterranean are, interest in donkey breeding has increased, due to interest in the nutritional properties of donkey milk for infant nutrition [2].

MATERIALS AND METHODS

PREPARATION OF EXTRACTS

Female donkey (n=5) was slaughtered at 6-7 years of age and final body weight of 160±25 kg. After trimming 5 kg of round meat was boiled in 20 L of water for 3 hrs. It was put in cold place (4°C) for 30min and the lipids on the surface was removed. The liquid was used as donkey meat extracts (DME) for further study.

ANALYSIS

Animals

Male Sprague-Dorsi (SD) rats (n=40) were purchased from Jungang Lab. Animal Co.(Korea) and randomly divided into control(CC), streptozotocin (STZ)-control(DC), 15mg DME fed group(DM1), and 30mg DME fed group(DM2). All animal experiments were conducted in accordance with the guideline of National Institute of Animal Science, RDA. The rats were housed under controlled condition (22-25°C, 12/12 light/dark cycle) and allowed to free access to feeds (AIN-93G)and water. Diabetes was induced by intravenous injection of STZ (Sigma, St. Louis, USA) in 0.1M citrate buffer (pH4.0) at a dose of 40mg/kg body weight [3]. Diabetes was confirmed by determination of blood glucose by ACCU-CHEK Compact (Roche, Diagnostics GmbH, Germany) and those rats with blood glucose above 400mg/dl were selected. Feed intake, water intake, and body weight were determined every week. Six weeks later, rats from each group were anesthetized by di-ethylether and blood were obtained by heart puncher.

Blood Analysis

At the end of experiment day, the collected blood samples were centrifuged at 3000 rpm for 15 min and serum was separated. The concentration of total, HDL-cholesterol, triglyceride in serum was determined enzymatically by using commercial kit (Asan pharmaceutical, Seoul, Korea). Also serum LDL-cholesterol content was calculated from the equation of Friedewald et al [4].

Organs

The rats' organs such as liver, spleen kidneys, and epididymal fat were removed and weighed.

Statistical Analysis

For determination of change of body weight, liver weight, plasma glucose concentration, plasma lipids, HDL and LDL-cholesterol, individual mouse was considered as an experimental unit. All data were analyzed by SAS software (2002). A general linear model procedure was performed and mean values and standard error were reported. Duncan's multiple range tests was used to compare the mean values and $p < 0.05$ was considered statistically significant.

RESULTS AND DISCUSSION

Table 1 shows protein and lipid contents, pH, and turbidity of donkey meat extract (DME). The DME Protein and lipid contents of DME were 3.43 and 1.22%, respectively. Also the DME showed week acidity. Fig. 1 indicates that STZ-induced diabetic rats showed higher feed intake than normal rats. There was no significant difference among treatments. Water intake of STZ-induced diabetic rats was also higher than the normal rats (Fig. 2). However, body weight of STZ-induced diabetic rats was significantly higher than normal rats. No effect of DME on body weight improvement was shown between treatments (Fig. 3). The blood glucose level of STZ-induced diabetic rats was shown interestingly reduced with administration of 15 and 30mg/kg of DME (Fig. 4). After 4 weeks of DME feeding, the blood glucose level was significantly reduced. We could not define what material work this kind of effect yet, further research should be done. Total cholesterol (TC), HDL cholesterol, and triglyceride (TG) of serum were determined that STZ-induced diabetic rats showed less HDL cholesterol and TG contents than normal rats and no difference was found between DME administration group (Table 2). However, the TC content of STZ-induced diabetic rats

showed no significant difference comparing to control. After administration of DME for 6 weeks, the body organs were selected and weighed. Kidney weights of STZ-induced diabetic rats were higher than that of normal rats (Fig 5). Also weights of spleen, testis, lungs were significantly lower than normal rat and DME did not showed beneficial effect on organ weight. Especially, the epididymal fats showed only in normal rats and STZ-induced diabetic rats have the epididymal fats less than detectable limit.

CONCLUSION

In Asian countries, the donkey meat has been used for not only red meat but also natural medicine for a long time. According to Dongeubogam, old book of Korean folk remedy, the donkey meat has effect on diabetes and skin problems. While the DME, the extracts of hot water, showed blood glucose reducing effect, no beneficial effect on blood lipids and body weight was shown. Therefore further research will be necessary to identify the compounds of reducing blood glucose level without harm the body organs.

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Table 1. Protein, lipid contents, and pH of donkey meat extracts

	Protein(mg/ml)	Lipids (%)	pH	Turbidity(NTU)
DME	3.43±0.000	1.22±0.000	6.13±0.015	8668.17±6.95

DME: Donkey meat extract

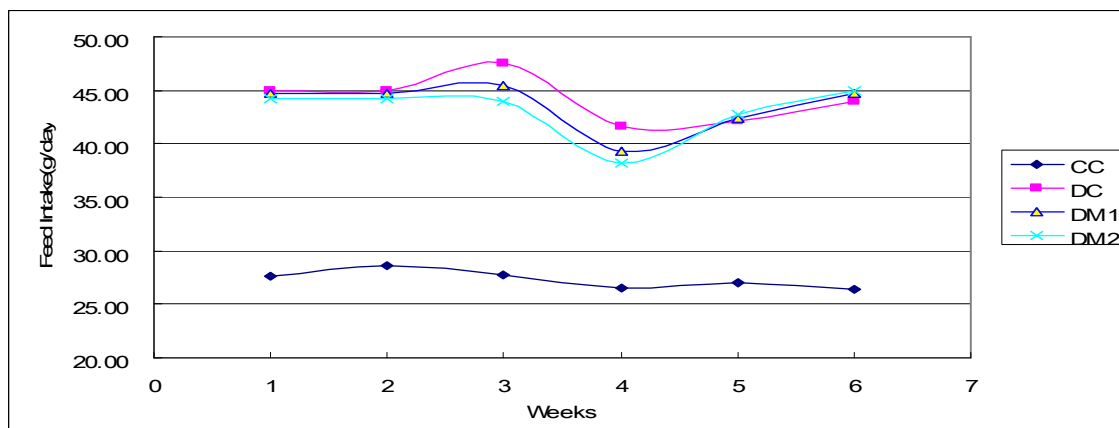


Fig. 1. Feed intake of STZ induced diabetic in rats fed donkey meat extracts

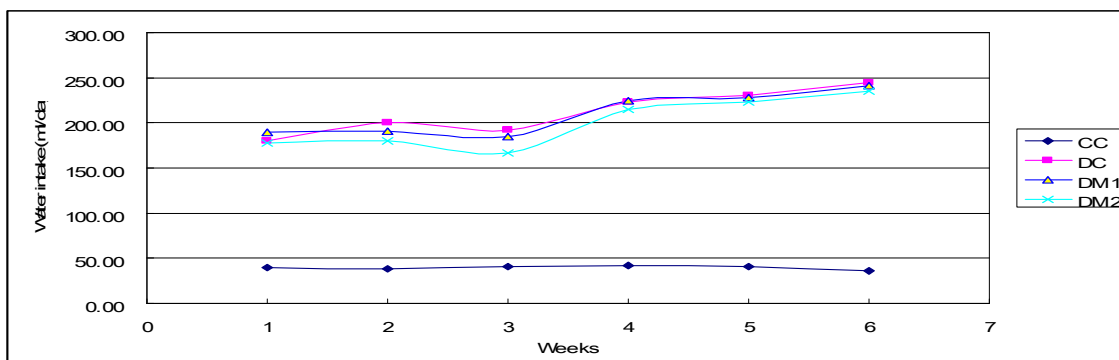


Fig. 2. Water intake of STZ induced diabetic in rats fed donkey meat extracts

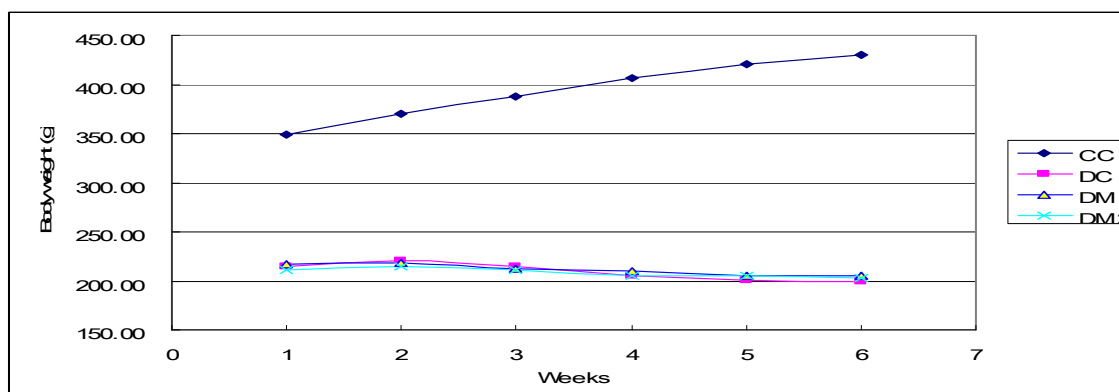


Fig. 3. Body weight of STZ induced diabetic in rats fed donkey meat extracts

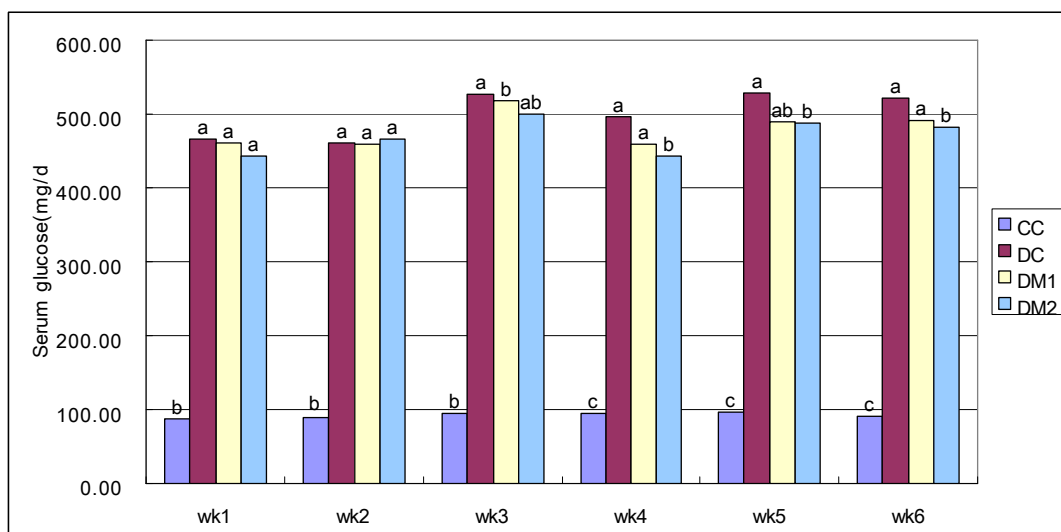


Fig. 4. Serum glucose level of STZ induced diabetic in rats fed donkey meat extracts

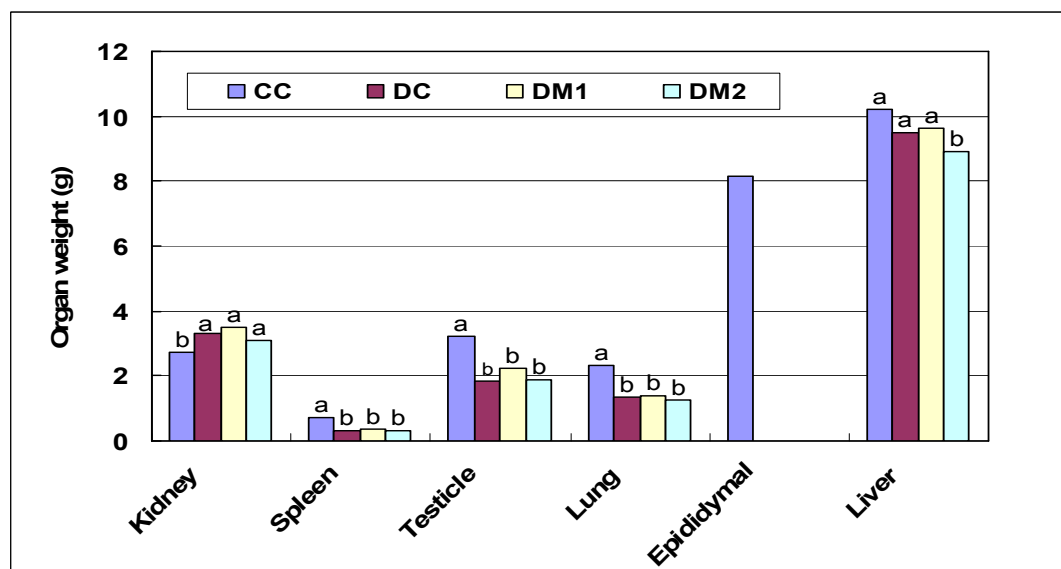


Fig. 5. Organ weight of STZ induced diabetic in rats fed donkey meat extracts

Table 2. Serum lipids of STZ induced diabetes in rats fed donkey meat extracts for 6 weeks

	CC	DC	DM1	DM2
HDL	31.99a±839	19.55b±356	23.16b±346	24.259b±653
LDL	4.864	33.97	8.961	4.725
TC	50.800b±1947	87.14a±13.16	66.283ab±23.14	65.680ab±22.15
TG	69.728b±2485	168.10a±59.04	170.807a±70.41	183.48a±59.11
AI	0.587	3.457	1.861	1.707

CC: Control, DC, STZ-control, DM1: Donkey meat extract 1, DM2: Donkey meat extract 2, HDL: High density lipoprotein, LDL: Low density lipoprotein= [(Total cholesterol-HDL cholesterol)- (triglyceride/5)], TC: Total cholesterol, TG: Triglyceride, AI: Atherosclerotic index = (Total cholesterol-HDL cholesterol)/ HDL cholesterol