Effect of Interval and Continued Exercises with Crocin on Bax/Bcl-2 in Diabetic Obese Rats

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Abstract

Objective: Diabetes is a metabolic disease which is linked to increased physical disabilities and muscle tissue damage. The aim of this study was to investigate the effect of interval and continued exercises with crocin on Bax/Bcl-2 ratio in diabetic obese rats.

Materials and Methods: In this clinical trial study, 56 adult diabetic rats (high-fat diet and venous injection of streptozotocin) were selected and randomly assigned to groups (1), intense interval exercises (2), low intensity exercise (3), intense interval exercise with crocin consumption, (4) Low intensity exercise with crocin consumption, (5) Crocin consumption, (6) sham and (7) control were divided. Intense interval and low intensity exercise groups lasted for 8 weeks, three sessions per week, with intensity of 80 to 85 and 50 to 55 percent of maximum treadmill running, and crocin consumption groups for 8 weeks per day, mg / kg 25 crocin were taken peritoneal. To analyze the research hypotheses, Kolmogorov- Smirnov tests, independent T- tests and two-way multi-variable analysis of variance were used along with Benferron's comparison method. It should be noted that the significance level in all measurements was considered to be *P*-value≤ 0.05.

Results: Results showed that exercise (*P*-value: 0.12) and crocin (*P*-value: 0.10) consumption had no significant effect on Bax/Bcl-2 gene expression in diabetic rats. Also interaction of exercise and crocin consumption on Bax/Bcl-2 was not significant (*P*-value: 0.12).

Conclusion: It appears that exercise and crocin consumption have not interaction effect on improvement of Bax / Bcl-2 ratio in diabetic rats.

Keywords: Diabetes, Bax/BCL2, Exercises, Crocin

Introduction

Diabetes is a metabolic disease which is linked to increased physical disabilities and muscle tissue damage. The aim of present study was to review the effect of interval and continued training with

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crocin on Bax/Bcl-2 ratio in diabetic obese rats.

Materials and Methods

This is an experimental and clinical trial study. The statistical sample of this study is 56 male Spravedodular male rats. Mice were kept in laboratory for one week in order to adapt to the laboratory environment. After one week, all rats were placed under high-fat diet for three months, containing 45% of total fat from fat (derived from animal fat) containing 24 grams of fat, 24 grams of protein and 41 grams of carbohydrate per 100 grams (1). After three months, induction of diabetes was performed by intravenous injection of a single dose of Streptozotocin in sodium citrate buffer (PH = 4.5) with 50 mg / kg intraperitoneal injection (1). In order to confirm the diabetes, 96 hours after the injection of Streptozotocin, a small drop of blood in the animal's tail was placed on the glucometer tape and read by the glucometer and the blood glucose in rats exceeded 300 mg / dl The title of the statistical sample was selected (1). In addition, rats with fasting glucose in 7 groups of 8 series (2) intense interval exercise, (3) low intensity exercise, (4) crocin consumption, (5) intense interval exercises with crocin, (6) Continuous low-intensity exercise with crocin consumption, (7) sham and (1) control. Subsequently, groups 1, 2, 4 and 5 ran on a treadmill for eight weeks and five sessions a week. Also, groups 3, 4 and 5 received crocin 25 mg / kg daily for eight weeks per week (1). At the end of the study, the rats were killed by the method of relaxation and placed in the laboratory to measure the variables of the rat liver tissue after exiting the body of rats.

The protocols involved intense exercise intervals with 80 to 85 percent maximum speed for 2 minutes and with 1 minute active periods of 6 to 12 training sessions in the last week. The total amount of exercise activity (severity, duration and repetition) between exercise groups (intense periodic exercise groups and continuous intensity exercise) in terms of intensity of activity of continuous training groups with a low intensity of 50 to 55% of the maximum running speed; identical Became Based on this, the duration of the continuous low intensity exercise group in the first week ranged from 25 minutes to 50 minutes per week (1).

In order to prepare the crocin, the first prepared crocin powder was first purchased, and then, each day, the amount of 495 mg of crocin, combined with 18 ml of physiological serum, was added daily to a predetermined amount with insulin syringe, intraperitoneally to the rat fields were injected.

To measure the gene expression of the variables, the time-real PCR method was used.

In the descriptive statistics section, mean and standard deviation (SD) were used. Also, Kolmogorov-Smirnov test and two-way multi-variable analysis of variance analysis were used to analyze the hypotheses of the research, along with Benferron's comparison method. It should be noted that the significance level in all measurements was considered as *P*-value ≤0.05.

Ethical considerations

Animal experimental procedures were in accordance with institutional guidelines and approved by the ethical committee of laboratory animals Care at Marvdasht Islamic Azad University, Marvdasht, Iran with ethical number of IR.MIAU.REC.1396.143.

Results

The results of the two-way ANOVA showed that exercises and crocin (*P*-value= 0.10, F= 2.78) had no significant effect on Bax/Bcl-2 gene expression in diabetic rats as well as interaction of exercise and crocin consumption on Bax/Bcl-2 was not significant (*P*-value= 0.15, F= 1.97).

Conclusions

The results showed that sport exercises did not significantly decrease the expression of Bax / Bcl-2 gene expression in diabetic rats. Crocin use had no significant effect on Bax / Bcl-2 ratios of diabetic obese rats. Also, the results

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of this study showed that the interaction of sport exercises and consumption of crocin on Bax / Bcl-2 ratio of diabetic rats was not significant. The BCL2 gene is a protein regulator of cell death (apoptosis) (8). Many studies have studied the effects of exercise on Bcl-2 and Bax. Tanoorsaz et al. (2018) showed that four weeks, five sessions per week of endurance training at speeds of 15 to 18 m / s for a period and for 25 to 44 minutes, significantly increased the levels of α and αFasL And the lack of changes in Bcl-2 levels in the heart tissue of diabetic and non-diabetic rats (9). The results of their study are incompatible with the current study, which may be due to differences in the intensity of the exercises and the duration of the exercises. Chen et al. (2013) showed that 11 weeks of treadmill running at 30 m / min for 30 or 60 minutes a day and three days a week in Doxorubicin induced CKD rats increased Bcl2 and cytochrome C Mitochondria, while Bax, SOD, MDA and Caspase levels decreased by 9, 3, 12 and 8 (10).

Krüger et al. examined the Bax / Bcl-2 ratio and apoptosis in the heart of the old rats by exercise. The results of their findings showed that exercise exercises increased the expression of Bcl-2 gene and decreased the expression of Bax gene expression in these animal specimens (11). This inconsistency may be due to the type of exercise, the duration of exercise, as well as the nutrition of subjects during the course of the protocol.

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References

1. Moradi A, Hosseini SA, Nikbakht M. Anti-apoptotic Effects of Interval and Continued Training and Crocin on the Muscle Tissue of the Rats with Type II Diabetes Induced by a High-fat Diet. Journal of Nutrition, Fasting and Health. 2019;7(3):130-7.
2. Rezaei Shirazi R. Effects of 12 weeks high intensity interval training on plasma Adiponectin, Leptin and insulin resistance in obese males with non-alcoholic fatty liver. Metabolism and exercise abiannul journal. 2015;5(1):23-34. (in Persian)
3. Hassan AF, Kamal MM. Effect of exercise training and anabolic androgenic steroids on hemodynamics, glycogen content, angiogenesis and apoptosis of cardiac muscle in adult male rats. International journal of health sciences. 2013;7(1):47.
4. Mother Shahian F, Hassan Abadi M, Goodwill Niko M. The effect of regular exercise on the cognitive status of overweight elderly and type 2 diabetes. Iranian Journal of Diabetes and Metabolism. 2011;10(5):553-9.
5. Kazemi S, Asgari S, Moshtaghian SJ, Rafieian M, Mahzooni P. Preventive Effect of Pumpkin (Cucurbita Pepo L.) on Diabetic Index and Histopathology of Pancreas in Alloxan-Induced Diabetes in Rats. Journal of Isfahan Medical School. 2011;28(117).
6. Asishirazi I, Hosseini Sa, Keikhosravi F. Hypoglycemic interactional effects of saffron (Crocus Sativus) aqueous extract and swimming training in streptozotocin induced diabetic rats. Journal of Sabzevar University of Medical Sciences. 2017; 24(4):273-9. (in Persian)
7. Dehghan F, Hajiaghaalipour F, Yusof A, Muniandy S, Hosseini SA, Heydari S, Salim LZ, Azarbayjani MA. Saffron with resistance exercise improves diabetic parameters through the GLUT4/AMPK pathway in-vitro and in-vivo. Scientific reports. 2016;6:25139.
8. Sari-Sarraf V, Amirsasan R, Sheikholeslami-Vatani D, Faraji H. Effect of creatine supplementation on the factors involved in apoptosis-related process (Bax, Bcl-2) and their ratio (Bcl-2/Bax) during acute resistance exercise in middle-aged men. Scientific Journal of Kurdistan University of Medical Sciences. 2016;21(4):17-28. (in Persian)
9. Tanoorsaz S, Behpour N, Tadibi V. Investigating the Effect of mid-term of aerobic exercise on apoptosis biomarkers in the cardiomyocytes of streptozotocin-induced diabetic rats. Journal of

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Fasa University of Medical Sciences. 2018;7(4):488-97. (in Persian)
10. Cheng SM, Ho TJ, Yang AL, Chen IJ, Kao CL, Wu FN, Lin JA, Kuo CH, Ou HC, Huang CY, Lee SD. Exercise training enhances cardiac IGFI-R/PI3K/Akt and Bcl-2 family associated pro-survival pathways in streptozotocin-induced diabetic rats. International journal of cardiology. 2013;167(2):478-85.
11. Krüger K, Mooren FC. Exercise-induced leukocyte apoptosis. Exercise immunology review. 2014;20.

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