Does Kombucha Extract Improve Obesity?

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***Abstract*—** Obesity is a major problem in developed and developing countries. The purpose of this study was to investigate the effects of kombucha extract on obesity in male Wistar rats. Animals were divided in 4 groups: 1) Control group which received water and normal diet (ND). 2) Sham group which received water and high fat diet (included: 66.5g Carbohydrate, 20.1g Fat, and 4.49g protein). 3) Experimental group1 which received high fat diet and kombucha extract. 4) Experimental group 2 which received ND and kombucha extract. After 8 weeks, body weight was determined in animals and blood serum was prepared and serum levels of triglyceride were measured. The results showed that the weight of animals significantly decreased in kombucha extract receiving animals compared to control group ($p<0.05$). Serum levels of triglyceride also significantly decreased in experimental groups compared with control group ($p<0.001$). Intake of the kombucha extract causes weight loss and reduces lipid storage, so, has a significant role in improving of obesity**.**

***Keywords*—** Kambucha, Obesity, Rat.

I. Introduction

Obesity is a significant health problem in developed and developing countries. It arises from genetic and environmental factors resulting in accumulation of fat in the body [1]. High calorie diet and inactivity has a significant role in obesity development [2]. High dietary fat intakes have also been linked to development of obesity. These foods bring about false satiety sensation, stimulating appetite resulting in overweight and increased fat storage [3], [4]. Since obesity is linked to development of diabetes and heart and liver diseases, improving of obesity play a significant role in improving of health aspects of human life and preventing the diseases concerned with obesity [5], [6], [7].

The name kombucha refers to any of a variety of preparations of fermented, lightly effervescent sweetened black or green tea drinks that are commonly used as functional beverages for their unsubstantiated health benefits. Kombucha is produced by fermenting tea using a symbiotic colony of bacteria and yeast. The yeast component generally includes *Saccharomyces* and other species, and the bacterial component almost always includes *Gluconacetobacter xylinus* to oxidize yeast-produced alcohols to acetic and other acids [2]-[8], [9]. Sucrose is converted, biochemically, into fructose and glucose, and these into gluconic acid and acetic acid, and these substances are present in the drink. In addition, Kombucha contains enzymes and amino acids, polyphenols, and various other organic acids; the exact quantities of these items vary between preparations. Other specific components include ethanol, glucuronic acid, glycerol, and B-vitamins. Kombucha has also been found to contain vitamin C [8]-[9], [10], [11] [12].

The effects of kombucha have been reported on treatment of a wide variety of human illnesses including diabetes, digestive system, rheumatoid disorders, hemorrhoid, liver, blood lipid profile and other body systems [10].

Although the beneficial effects of kombucha have been reported, there is insufficient evidence to support such claims. The aim of our study was to determine the effects of kombucha extract on obesity in male Wistar rats.

II. Material and Methods

A. Animals

Adult Wistar rats weighting 240g were purchased and raised in our colony from an original stock of Pasteur institute (Tehran, Iran).The temperature was at 23±2 ^{0}C and animals kept under a schedule of 12h light:12h darkness (light on at: 08: 00 a.m.) with free access to water and standard laboratory chow. Care was taken to examine the animals for general pathological symptoms. Food was withheld for 12-14h before death.

B. Kombucha preparation

Kombucha were prepared using black tea. Briefly, 3.0 g of black tea was steeped in 400 mL of boiling water and for 20 min. The infusions were then filtered using filter paper and sucrose (5%) was subsequently dissolved in the resulting clear filtrate. Subsequently, 200 mL of sugared tea filtrates were poured into a 500 mL Erlenmeyer flask, followed by sterilization at 115 ºC for 15 min. After cooling to room temperature, the Erlenmeyer flask was inoculated with 5% culture. The Erlenmeyer flask was carefully covered, and fermentation was performed at 30 ºC with shaking (100 rpm) for 90 h [13].

C. Protocol of Study

In this laboratory experimental study, male Wistar rats were divided in 4 groups (n=6 in each group): 1) Control group which received water and normal diet. 2) Sham group which received water and high fat diet (included: 66.5g Carbohydrate, 20.1g Fat, and 4.49g protein). 3) Experimental group1 which received high fat diet and kombucha extract. 4) Experimental group 2 which received normal diet and kombucha extract. After 8 weeks, body weight was determined in animals and blood serum was prepared and serum levels of triglyceride were measured. All animal experiments were carried out in accordance with the guidelines of Institutional Animals Ethics Committee.

D. Statistical Analysis

All values are presented as mean ± S.E.M. Statistical significance was evaluated by one-way analysis of variance (ANOVA) using SPSS 19. Significance was measured using Fisher's least significant for the exact P values and

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significant differences are noted in the results. Differences with P<0.05 were considered significant

III. Results

Figure I, II and III also show body weight and serum levels of triglyceride in animals.

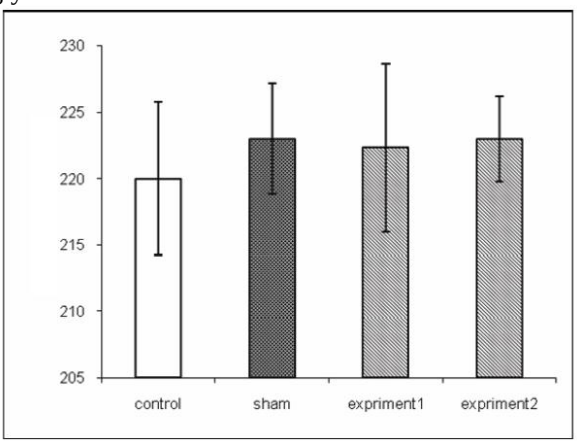

Fig. 1. Body weight before experiment. There are no significant differences in body weight between groups.

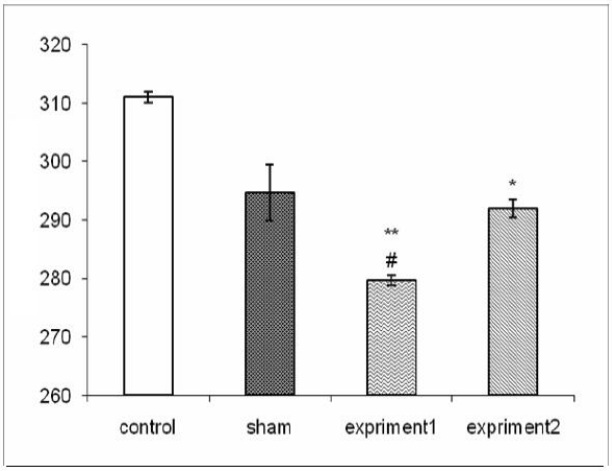

Fig. 2 Body weight after experiment. ** indicates significant difference (P<0.01) and * indicates significant difference (P<0.05) compared to control animals and # indicates significant difference (P<0.05) compared to sham animals.

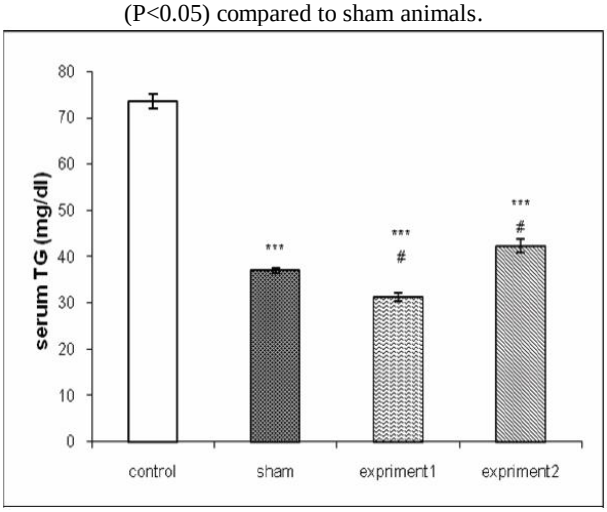

Fig.3 Serum triglyceride levels after experiment. *** indicates significant difference (P<0.001) compared to control animals and # indicates significant difference (P<0.05) compared to sham animals.

The results showed that the weight of animals significantly decreased in kombucha extract receiving animals compared to control group (p<0.05). Serum levels of triglyceride also significantly decreased in experimental groups compared with control group (p<0.001).

IV. Discussion

Our study indicated that kombucha extract has protective effects against weight gain and triglyceride increasing in male rats. In line with this finding there are other reports indicating that vitamin C can increase beta-oxidation of fatty acids in liver resulting in decreased blood triglyceride levels [14], according to which, the effects of kombucha extract on triglyceride can be attributed to vitamin C existing in the extract. Vitamin B3 (niacin) is the other component found in kombucha extract. The studies show that this vitamin also has reducing effects on triglyceride metabolism in liver [14]. Mostly the effect of kombucha extract on improving obesity is attributed to acid contents of the extract among which lactic acid is the prominent one [12]. The studies show that diets containing fermented lactobacillus result in decreased weight gain [12].

V. Conclusion

The findings suggest that kombucha extract has protective effects against weight gain and increasing of triglyceride in animals receiving high fat diet.

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