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Effects of Slim-Quick and Fat Stops on Ghrelin and NeuropeptideY in Rats

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Abstract

Introduction: In addition to exercise and diet, medications also have a special role in weight loss. The aim of this study is to evaluate the effects of Slim-quick herbal medicine and Fat Stop synthetic medicine, and compare these two with the serum levels of ghrelin and neuropeptide Y hormones as well as the body weight changes in adult female rats. Methods: In this experimental study, 32 adult female Wistar rats were divided into 4 groups of 8, including control group - slim-quick 200 mg/kg, Fat stop 200 mg/kg, and simultaneous recipient group - slim-quick 200 mg/kg, Fat stop 200 mg/kg. Slim-Quick and Fat-Stops were fed to animals by gavage. In the 29th day after the start of the experiment and weighing of the animals, blood sampling was performed from the heart and the serum concentration of the ghrelin neuropeptide Y was measured. The results were analyzed by ANOVA and Duncan tests at a significant level of $p \leq 0.05$. Results: the decrease in serum levels of ghrelin and neuropeptide Y and weight loss was significantly higher in the simultaneous recipients of Slim-Quick and Fat-Stop than the separate recipients of the two medicines. Conclusion: Simultaneous application of Slim-Quick and Fat-stop reduces the body weight by decreasing the serum levels of orexigenic ghrelin hormone and Y neuropeptide.

Key words: Slim-quick, Fat-Stop, ghrelin, Y Neuropeptide, Body Weight, Rat.

Introduction

The prevalence of overweight and obesity is rising at an alarming rate in virtually all societies and age groups around the world. Obesity has achieved worldwide plague extents with high prevalence (Mashaal , et al., 2018). Physiological and metabolic changes due to increased fat tissue and changes in energy balance result in some chronic diseases such as cardiovascular diseases, atherosclerosis, metabolic syndrome and type 2 diabetes (Zamboni & et al, 2005; Pittler & Ernst 2005). Even some experts go further and believe that the increase in body mass (overweight) has stopped the process of hope for humanity and may even have reversed it (Shafiei Jahromi, 2018). Obesity has a substantial impact on a person's functional capacity and the quality of life(Antony & Azeem, 2019).

In addition to exercise and diet, medications also have a special role in weight loss. Weight-loss medicines are categorized into two types of herbal and synthetic drugs. Orlistat or Fat Stop, is a synthetic medicine whereas Slim-quick is a common herbal medicine being available in the market for obesity and overweight (Kianbakht, 2010).

Fat-stop is one of the lipase inhibitors that inhibits the enzyme to prevent the absorption of one-third of the fat in the food. By doing this, the body gradually decreases the amount of fat uses its reserves resulting in the occurrence of the weight loss phenomenon (Filippatos & et al, 2008; Athyros & et al, 2001).

Slim-quick has extracts of celery, dill and green tea (Kianbakht, 2010). Clinical studies have shown that the extracts of celery and dill have a positive effect on the center of appetite in the brain and cause an interruption in the transmission of hunger. In addition, flavonoids in the product have an inhibitory effect on the lipoxygenase enzyme. Clinical experiments on this drug have shown the effects of lowering blood lipids and cholesterol levels. Seeds of celery and dill (its fruit) act as a synergist on the centers of hunger and inhibit it. The active ingredients in this product increase fat metabolism and reduce blood lipids and also prevent fat absorption in the intestine. Caffeine in green tea inhibits phosphodiesterase enzyme, strengthening the effect of epinephrine in the body. The catechin of green tea as well as the caffeine inhibit the COMT enzyme, thereby increasing the concentration of catecholamine and metabolism (Mehdizade & et al, 2009; Chacko & et al, 2009). Green tea reduces fat in all parts of the body by increasing the oxidation of fat in the liver (Venables & et al, 2008). Thus, taking this pill reduces the risk of developing type 2 diabetes. Therefore, in the present study, the effects of Slim-quick and Fat-Stop medicines on two orexigenic hormones, i.e. ghrelin and Y neuropeptide were evaluated. The study also provided an opportunity to compare the effectiveness of each of these herbal and synthetic drugs alone as well as their simultaneous effectiveness in in weight loss.

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Materials and Methods

In this experimental study, 32 adult female Wistar rats weighing 180-200 g were used. The rats were kept in the animal breeding room of Jahrom University of Medical Sciences for one week in order to adapt to the environment. Throughout the study, the animals were kept in 12-hour brightness and 12 hours of darkness, and at an ambient temperature of 20- 25ºC; furthermore, they were free to have access to water and food.

The rats were randomly divided into 5 groups of 8 as follows:

Control group: This group did not receive any treatment during the experiment (28 days).

Experimental group 1 (Slim-quick): During the experiment (28 days), the group received a dose of 200 mg/kg of slim-quick dissolved in one ml of distilled water in the course of the experiment (28 days) by gavage and according to the body weight.

Experimental groups 2 (Fat-STOP): During the experiment (28 days), the group received a dose of 200 mg/kg Fat-stop dissolved in one ml of distilled water by gavage and according to the body weight.

Experimental groups 3 (Slim-quick & Fat-STOP): During the experiment (28 days), the group received a dose of 200 mg/kg Fat-stop as well as a 200 mg/kg slim-quick dissolved in one ml of distilled water by gavage and according to the body weight.

At the end of the study (day 29), after weighing the animals, blood samples were taken directly from the heart of the animals using a 5cc syringe (under anesthetics by diethyl ether) and their serum was collected by centrifuge (for 15 minutes and 3000 RPM) being stored at -20 ° C until the test was completed. For the measurement of ghrelin and Y neuropeptide, Elisa kits for rat were used.

One-way ANOVA was used to analyze the data. In cases where the difference between the groups was significant, Duncan's test was used to find out the difference between the means. Statistical analysis was performed by SPSS software version 21 and significant level ($P < 0.05$) was considered. Data were computed and the results were expressed as Mean ± SEM.

Findings

Based on the findings of Table 1, a dose of 200 mg/kg of Slim-quick significantly reduced the serum levels of ghrelin and Y neuropeptide (NPY) compared to the control group ($P < 0.05$). The mean of body weight changes also showed that 200 mg/kg slim- Quick significantly reduced body weight compared to the control group ($P < 0.05$).

In the group receiving 200 mg/kg of Fat stop, a decrease was observed in the serum levels of ghrelin and neuropeptide Y (NPY) hormones. Mean changes in body weight also showed that all three experimental groups experienced a significant decrease in the body weight compared to the control group ($P < 0.05$).

Concerning the group receiving Fat Stop and Slim-Quick simultaneously, there was a decrease in serum level of ghrelin and NPY hormones as compared to the control group ($P < 0.05$). Comparing the group receiving fat stop and slim-quick simultaneously with the groups receiving the two drugs separately, it is determined that the simultaneous use of these two medicines increases the efficacy of reducing the hormones of ghrelin and NPY compared with the separate use of each medicine.

Table 1- Comparison of serum levels of ghrelin and neuropeptide Y and body weight in different experimental groups and the control group

Group / variable	control	Slim-quick (200 mg / kg)	Fat Stop (mg / kg) 200	Slim-quick (200 mg / kg) & Fat Stop (mg / kg) 200
Ghrelin	2873.75±112.19c	2600.75±14.77b	2670.5± 23.89b	2288.5± 43.33a
Neuropeptide Y	172±12.12c	378.72±29.46b	492.45± 21.12b	433.35±44.60a
Mean changes of the body weight	31.25±1.65d	9.75±1.37	17.5±2.88c	-4.25±1.36a

- Based on the Duncan test, the means in each row, which have at least one common point, do not differ significantly in the Duncan test at the 5% level.
- Means are given as Mean ± SEM.
- $P < 0.05$ was considered statistically significant.

Discussion and Conclusion

Based on the results of this study, in each of the groups receiving Slim Quick and Fat Stops separately, a decrease in serum levels of ghrelin and neuropeptide (NPY) hormones was observed in rats with normal diet. Comparing the group receiving Fat stop and slim-quick simultaneously with the groups receiving the two drugs separately, it was found that the use of these two drugs simultaneously was more effective in reducing the orexigenic ghrelin and NPY hormones.

The ghrelin peptide 28 is an amino acid that is mainly isolated from the human and animals' stomach. Although ghrelin is known to be the receptor of growth hormone' secretion (IRAN & et al, 2010), this hormone contributes to regulating food intake (Soares & Leite-Moreira, 2008), energy homeostasis, and weight adjustment through mechanisms independent of growth

hormone (Fujimiya & et al, 2006). Long-term injection of ghrelin into rodents increases the intake of food and reduces energy consumption and ultimately leads to weight gain (Soares & Leite-Moreira, 2008). On the other hand, the temporary inhibition of ghrelin transmission by various methods reduces food intake and body weight (Tschöp, Smiley & Heiman, 2000).

Neuropeptide Y (NPY) is the most abundant hypothalamic peptide; its most important effect is stimulating food behaviors, in other words, the NPY gene is a candidate for obesity and an appetite stimulating peptide, playing a significant role in receiving food, selecting food, adjusting the weight and Energy homeostasis (Hamedinia, Davarzani & Hosseini, 2011). NPY also reduces energy consumption (Salim & et al, 2010). Many factors, including leptin, insulin and ghrelin, affect the amount of NPY circulation (Hamedinia, Davarzani & Hosseini, 2011). Recent studies using electron microscopy and immunohistochemical methods have demonstrated the interaction between the ghrelin and the neuropeptide Y expressing neurons in the Arctic nucleus (ArcN) (Chen & et al, 2004). Intravenous or central injection of ghrelin, in addition to increasing the secretion of the growth hormone, increases NPY expression by increasing the intake of food and body weight in humans and rodents (Kojima & Kangawa, 2005). It has also been shown that the environmental infusion of the neuropeptide Y hormone stops the appetite stimulating effects of ghrelin (Keen-Rhinehart & Bartness, 2007). This suggests that NPY neurons in the Arctic nucleus of the hypothalamus (ArcN) can be an important effector for the functioning of the ghrelin.

Conclusion:

Simultaneous use of Slim-quick and Fat stop has a greater effect on the reduction of levels of the orexigenic ghrelin and NPY hormones as well as reducing the body weight compared to the separate use of each. Considering the greater popularity of using herbal medicines, the simultaneous use of an herbal medicine and a synthetic product may, in part, reduce the side effects of synthetic drugs and increase the effectiveness of herbal medicine in reducing body weight.

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