



Evaluation of the Relationship Between Ghrelin Hormone Level and Some Anthropometric Variables in Women Referring to Imam Reza Hospital, Tehran, Iran

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Abstract

Background: Ghrelin is secreted by gastric cells to stimulate hunger.

Objectives: The aim of this study was to investigate the relationship between the serum concentration of ghrelin and some anthropometric variables.

Methods: This descriptive cross-sectional study was performed on 90 healthy women. The serum ghrelin level was measured by ELISA method and data were statistically analyzed by Pearson analysis.

Results: There was a significant correlation between the ghrelin level and age ($r = -0.3$; $P = 0.000$), body weight ($r = -0.2$; $P = 0.03$), BMI ($r = -0.4$; $P = 0.001$), and height to wrist ratio ($r = 0.3$; $p = 0.004$). Nevertheless, there was no significant correlation between ghrelin level and central obesity.

Conclusions: It seems that serum ghrelin level is associated with height to wrist ratio in healthy women.

Keywords: Ghrelin, Anthropometric, Serum, Women

1. Background

Ghrelin is a peptide hormone composed of 28 amino acids. This hormone stimulates hunger and secreted from gastric cells and epsilon cells in the pancreas (1). The concentration of this hormone increases before eating and then decreases (2). Its receptors are present in a wide range of tissues including pituitary, stomach, intestine, pancreas, thymus gland, thyroid, and heart. The diversity of receptors in various tissues indicates the various biological functions of the hormone. It is also a powerful stimulant to secrete the growth hormone from the anterior pituitary (2) Ghrelin, through this effect, affects the intake of energy, increases energy intake, and thus causes obesity (3). The relationship between levels of various hormones and anthropometric variables has been shown in previous studies (4-6). However, a few studies have been conducted on the relationship between the level of serum ghrelin and anthropometric variables such as age, BMI, and central obesity (7-10). To our current knowledge, no study has been done regarding the relationship between ghrelin level and the height to wrist ratio.

2. Objective

The aim of this study was to investigate the relationship between the serum concentration of ghrelin and some of the anthropometric variables such as age, weight, BMI, height-to-wrist ratio, and central obesity in healthy women.

3. Methods

This descriptive cross-sectional study was performed on 90 healthy women who referred to Imam Reza Hospital in Tehran for annual examinations in 2016. After explaining the objectives of this study, their consent was received. The measured anthropometric variables included body weight, height, waist circumference, hip circumference, central obesity, body mass index, and height-to-wrist ratio. Their weight and height were measured with a height scale and weight scale (health scale) made in China without shoes and with light clothing. Waist circumference, hip circumference, and wrist circumference were measured by a fabric gauge. Body mass index (BMI) was calculated by dividing the weight (Kg) by the height squared

(m²). Abdominal obesity was obtained using waist (cm) to hip (cm) ratio (11).

A 5-mL fasting blood sample was taken from each subject. Blood samples were centrifuged and serum was kept at -4°C. The serum ghrelin level was measured by ELISA method (CRYSTAL DAY CHRISTIAN DAY kit - China).

Data were analyzed by SPSS 18 software. Descriptive statistics were used to express the mean values of the anthropometric variables and serum ghrelin level. The Pearson correlation test was used to determine the relationship between ghrelin hormone levels and anthropometric variables. Data are shown as mean \pm SEM and $P < 0.05$ was considered significant.

4. Results

Some laboratory and anthropometric characteristics of women are shown in Table 1.

Table 1. Laboratory and Anthropometric Characteristics of Healthy Women Referring to Imam Reza Hospital of AJA (2016)

Variable	Mean \pm SEM
Serum ghrelin Level, ng/mL	3.2 \pm 0.4
Age, y	41.2 \pm 1.6
Height, cm	167 \pm 0.9
Weight, kg	71 \pm 1.4
Wrist, cm	16.3 \pm 0.1
Waist, cm	89.8 \pm 1.5
Hip circumference, cm	109.5 \pm 2
Height /wrist ratio	10.3 \pm 0.1
BMI, kg/m ²	25.5 \pm 0.5
Waist to hip ratio, cm	0.8 \pm 0.08

There was a significant negative correlation between the ghrelin level and age, body weight, and BMI. In addition, there was a significant positive correlation between ghrelin and height to wrist ratio. Nevertheless, there was no significant correlation between ghrelin level and central obesity (Table 2).

5. Discussion

The results of this study showed that there was a negative correlation between the concentration of ghrelin hormone and age, body weight, and BMI. In addition, there was a positive relationship between the concentration of this hormone and the height to wrist ratio. Ghrelin is secreted by the cells of the Xa region of the fundus of the

stomach. The number of these cells is very low during the embryo and at the beginning of the birth. As the age increases in the first few months, the number of these cells increases leading to the increased secretion of ghrelin. It is possible that the level of this hormone also changes in the elderly due to the decreased ability of the stomach and digestive system to secrete ghrelin. Concomitant with the results of this study, the study of Rigamonti et al. (2002) showed that the level of ghrelin decreases with age (7).

In contrast, in a study conducted by Serra Prat et al. (2015), there was no meaningful correlation between the level of ghrelin and age (12). Appetite also decreases with age that may be due to the reduced ghrelin secretion. In agreement with the results of this study, most previous studies showed a negative correlation between the concentration of ghrelin hormone and body weight and BMI.

A study by Marzullo et al. on the relationship between the concentration of ghrelin and obesity, showed that serum ghrelin concentrations were lower in obese subjects than in lean subjects (8). A study conducted by Lindeman in adults who were divided into two groups of obese and lean also showed that ghrelin had a significant inverse relationship with BMI (9). The study by Monti et al. in humans showed that with an increase in BMI, the level of the ghrelin hormone decreases (10). It has been shown that increased body mass causes increased leptin secretion (8) and there is a negative correlation between leptin and ghrelin level (10). Therefore, probably the lower ghrelin levels in obese individuals can be due to the more secretion of leptin from adipose tissue in these individuals.

The present study showed that the height to wrist ratio, which is a characteristic of the skeletal structure of individuals, is directly related to the concentration of this hormone. Most previous studies have examined the relationship between ghrelin and bone density (13-16). To our current knowledge, the present study is the first to investigate the relationship between ghrelin and the height to wrist ratio.

Obesity is due to an increase in the overall body fat. A type of obesity that is more dangerous than the other types of obesity is central obesity (17).

In a previous study has shown that intravenous ghrelin injection increased retroperitoneal and inguinal white adipose tissue volume in rats, followed by abdominal obesity (18). Nevertheless, our study did not show any correlation between ghrelin concentration and central obesity. Therefore, it seems that the natural concentration of ghrelin has no effect on the fatty mass of the abdomen in humans. Further studies are needed concerning ghrelin and central obesity in animal and human models.

Table 2. The Relationship Between Ghrelin Level and Anthropometric Variables in Healthy Women Referring to Imam Reza Hospital of AJA in 2016

	Age	Weight	Wrist Circumference	Waist Circumference	Hip Circumference	Height to Wrist Ratio	BMI	Waist to Hip Ratio
Ghrelin level	R = - 0.4; P = 0.000	R = - 0.2; P = 0.03	R = - 0.2; P = 0.06	R = -0.24; P = 0.02	R = -0.3; P = 0.003	R = 0.3; P = 0.004	R = -0.4; P = 0.001	R = -0.1; P = 0.3

5.1. Conclusions

It seems that serum ghrelin level is associated with height to wrist ratio in healthy women.

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