Original Article

Socioeconomic and Reproductive Determinants of Waist-Hip Ratio Index in Menopausal Women

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ABSTRACT

Background: Health evaluation is carried out using various anthropometric methods including waist–hip ratio (WHR) index. This method is applied for estimating body fat distribution. This study was aimed to investigate the socioeconomic and reproductive determinants of WHR index in menopausal women. **Materials and Methods:** For this cross-sectional study, samples were 278 menopausal women in Isfahan, Iran, who were selected by stratified sampling and invited to ten health centers. The data collection tools were a questionnaire and the standard meter tape. Data were analyzed using descriptive and inferential statistical tests. **Results:** The mean of WHR index was $\overline{X} = 0.9 \pm 7.54$. There was a significantly statistical relation between age, job, educational status, number of pregnancies and deliveries, age of the first delivery, and WHR index. **Conclusion:** Based on the results, body fat distribution of menopausal women is of android (central) type. It is suggested that measuring WHR index should be done in menopausal women and also during the postpartum period in specific intervals. Furthermore, women should be familiarized with related factors to this index, and it is recommended to avoid pregnancy and delivery at early ages and repeated pregnancies.

KEYWORDS: *Body composition, Body fat distribution, Body shape, Menopause, waist–hip ratio*

INTRODUCTION

Anthropometric indices such as weight, body mass index (BMI), waist circumference (WC) and waist–hip ratio (WHR) are considered for obesity evaluation. Although BMI is more used as the measure of general obesity for considering risk factors related to diseases, studies have shown that the type of body fat distribution plays a more important role in identifying the risks of diseases compared to BMI.[1]

Body fat distribution is described in two forms of android (apple-shaped) and gynoid (pear-shaped).[2] One-way to assess body fat distribution is measuring WHR. It is believed that WHR above 0.90 for males and above 0.85 for females would indicate central body fat distribution and is considered to be a risk factor for cardiovascular diseases, hypertension, and diabetes.[1]

It seems that fat mass in menopausal women increases and it will change from gynoid form to android form.[3,4]

Changes related to menopause which turn into central body fat distribution cannot be solely counted by one factor, and all the factors should be included as well. However, there are some controversies about the related factors. It seems that in the middle-aged menopausal women although the genetic factors are responsible for 60% of the central body fat distribution, the environmental factors also can result in android obesity.[5]

Android obesity at this period of life is an important issue to predict breast cancer risk[6] and increases the spread of different illnesses such as cardiovascular diseases,[7] hypertension, type 2 diabetes, and metabolic syndrome and would result in increased rate of mortality

and morbidity.[8-10] Health promotion and the feeling of well-being at each period of life of a woman would bring her a better quality of life which would be fruitful for the society. Since menopausal women are members of the society and counted as transferring agents from one generation to another, their health promotion is a very important principle to be taken into consideration.[11]

Therefore, by evaluating the type of body fat distribution in menopausal women and its determinants, health care authorities could become aware to use interventions before the occurrence of diseases, programming and appropriate measures to bring this pattern of body fat distribution to optimal. Hence, this research was carried out to determine WHR index in menopausal women and its socioeconomic and reproductive determinants.

MATERIALS AND METHODS

Design and sample

This was a cross-sectional study. The samples were 278 postmenopausal women from Isfahan, Iran, who were selected by stratified sampling and then invited to ten health centers (which were selected randomly). The sample size was calculated with a confidence interval of 95%, accuracy of 0.5 and a minimum power of 80%.

The exclusion criteria were not having Iranian nationality, being under treatment for losing or gaining weight (pharmaceutical, physical, or dietary), having known psychological disorders (anorexia nervosa, bulimia nervosa, depression, and bipolar disorders), having motor system problems, using drugs such as corticosteroids, Levothyroxine, Metimazole, Propylthiouracil, Danazol, and estrogen and progesterone compounds, or having known diseases such as Cushing, diabetes, hypothyroidism and hyperthyroidism, gastric and duodenal ulcer, ulcerative colitis, and cancer.

Data collection

Data were gathered using a standard meter tape and a researcher made questionnaire which included questions about socioeconomic and reproductive characteristics. To determine questionnaire's validity and reliability, content validity method and test-retest were used, respectively.

For gathering data, three expert midwives who were selected as interviewers called postmenopausal women who had medical files at the health centers and invited them for cooperation. Then considering the inclusion criteria of the research, they tried to complete the questionnaire. Then the WC (the thinnest WC in the middle part of the upper projection of the iliac bone and the ending part of the ribs in the middle axillary line) and hip circumference (the widest hip circumference in horizontal line) were measured using the standard meter tape.[1]

Ethical considerations

Research ethics confirmation (Ethical Approval code: 385005) was received from Ethics Committee of Isfahan University of Medical Sciences, and written informed consent, anonymity, confidentiality, and the right of leaving the research at any desired time were preserved.

Statistical analysis

To analyze the data, descriptive (mean, standard deviation, minimum and maximum) and inferential statistics (Pearson correlation coefficient, one-way variance analysis, and independent *t*-test) were used. A *P* value under 0.05 was considered statistically significant.

RESULTS

Results showed that the mean of WHR index for menopausal women was $\overline{X} = 0.9 \pm 7.54$ and its minimum and maximum were 0.72 and 1.16, respectively.

Furthermore, the results showed that there was a significant statistical relation between age ($P = 0.001$), job ($P = 0.009$), and educational status ($P < 0.001$) with WHR index [Table 1], which means that women with the age of 60 or younger had a lower WHR index compared to women of older than 60.

Furthermore, the mean of WHR index in homemakers (0.91 ± 7.43) was higher in comparison to women who worked at home (0.9 ± 4.94), women who worked out (0.82 ± 7.41), and retired women (0.86 ± 8.33).

Moreover, WHR index in illiterate women was more than that of women who had elementary school, middle school, high school, and academic education.

In this research, regarding the reproductive characteristics, results showed a significant statistical relation between the number of pregnancies ($P = 0.001$), the number of deliveries ($P = 0.001$), the age of the first

Table 1: The applied tests and *P* values of the relation between variables and waist-hip ratio index

Variable	Test	*P*
Age	Correlation coefficient (r=0.206)	0.001
Job	One-way variance analysis	0.009
Educational status	Correlation coefficient (r=0.216)	<0.001
Menarche age	Correlation coefficient (r=−0.113)	0.06
Menopausal age	Correlation coefficient (r=0.03)	0.5
Number of pregnancies	Correlation coefficient (r=0.24)	0.001
Number of deliveries	Correlation coefficient (r=0.26)	0.001
Age of the first delivery	Correlation coefficient (r=−0.14)	0.01
Age of the last delivery	Correlation coefficient (r=0.11)	0.06
Breastfeeding history	Independent *t*-test (t=−1.34)	0.18
Average length of menstrual cycles	Correlation coefficient (r=−0.49)	0.41

delivery (P = 0.01), and WHR index [Table 1], which means that WHR index in women who had three or more pregnancies and deliveries was higher than those who had less pregnancies and deliveries.

Furthermore, WHR index in women who had their first delivery under the age of 20 was higher than those who had their first delivery after the age of 20.

There was no meaningful relation between other factors such as the age of the last delivery, menarche age, the average length of menstrual cycles, breastfeeding history, and menopausal age with WHR index (P > 0.05).

DISCUSSION

Results of the present study showed that regarding the mean of WHR index in postmenopausal women, type of body fat distribution among them was of android type. In this relation, Nadira *et al.* in a study showed acceleration in abdominal fat accumulation in postmenopausal women.[12]

Regarding the gained WHR index in menopausal women, it seems that in menopausal period, the type of body fat distribution will change from gynoid form to android form.[1]

Results of the present study showed that women older than 60 had a higher WHR index. It seems that there is a great tendency for creating central obesity as the age increases that has negative health consequences.[13,14]

According to the results of the present study, WHR index decreases as the educational level increases. Kang *et al.* also showed that abdominal obesity was associated with education.[15]

It seems that women with higher educational levels pay more attention to their health condition and they are more concerned about it due to being aware of the complications of extra fat tissue. Hence, they are, especially, careful about their diet, activity, and sport programs. Thus, attempts should be made to elevate the level of education and have illiteracy campaigns, especially for women and create the chance for them to be educated in different levels such as higher education and university.

Based on the results of the present study, WHR index in women working outside the house is lower than the other groups.

In this regard, the results of Carter *et al.* showed that occupation is one of the predictive factors of WHR index in women at the age of 60 and older.[16]

It seems that working women, due to having more social interactions and being more aware of the unpleasant body fat distributions, central obesity and its control enjoy a lower WHR index. Furthermore, it is presumed that these women, compared to homemakers, retired and working women at home are probably more physically active and as a result, they spend more energy. Therefore, special efforts should be made so that women would continue their education in different educational levels and more job opportunities should be made for them in different social levels.

According to the results of the present study as the number of pregnancies and parity increase, WHR index in menopausal women would increase.

In a study by Li *et al.*, results indicated that parity was positively associated with risk of obesity, especially abdominal obesity, in long-term among Chinese women.[17]

Furthermore, the researchers of a study in Finland reported that abdominal obesity was more prevalent among multiparous women than the other groups.[18]

Thus, necessary education should be presented through mass media and at the health centers for women at reproductive ages about limiting the number of pregnancies and deliveries so that unpleasant body fat distribution following repeated pregnancy and delivery and also during menopausal period could be avoided.

In the present research, a reverse significant statistical relation was observed between the age of the first delivery and WHR index.

Sim *et al.* in a study in Korea showed that younger maternal age at the first delivery was independently associated with higher risk of central obesity in postmenopausal women.[19]

Therefore, using television, newspaper, and all the mess media, necessary education should be given about avoiding pregnancy at younger ages (adolescent pregnancy) as an effective factor on abdominal body fat distribution.

This study has some limitations. First, as it was cross-sectional in design, we cannot determine the causal relationships between socioeconomic and reproductive variables and WHR index in menopausal women. Second, it is about information retrieval related to the past time which is based on the participants' memories and could have been effective in data collection.

CONCLUSION

Considering central body fat distribution in menopausal women, it is suggested that measuring WHR index should be done during the postpartum period and also

in menopausal women at specific intervals to avoid poor outcomes related to abdominal body fat distribution. Furthermore, women should be familiarized with related factors to this index and it is recommended to avoid pregnancy and delivery at early ages and repeated pregnancies.

Conflicts of interest

There are no conflicts of interest.

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