

*Original Article***Type of body fat distribution in postmenopausal women and its related factors***Mahnaz Noroozi^{*}, Zahra Rastegari^{**}, Zamzam Paknahad^{***}***Abstract**

BACKGROUND: The type of body fat distribution has an important role for identifying risk of diseases. One of the simple anthropometric indexes for estimating type of body fat distribution is waist circumference index. This study is aimed to determine the type of body fat distribution in postmenopausal women and its related factors.

METHODS: This is a cross sectional descriptive analytical study. Samples were 278 postmenopausal women in Isfahan who were selected by stratified sampling and then were invited to 64 health centers of Isfahan. Data was gathered using a questionnaire and standard meter. Data was analyzed using SPSS software and descriptive and inferential statistics.

RESULTS: Results showed that in postmenopausal women the mean of waist circumference index was 93.63 (10.66) and its range was 54 to 119 cm. There was a meaningful relation between job, educational status, total pregnancies, total deliveries, age of first pregnancy, lactation history and menopausal age with waist circumference index.

CONCLUSIONS: Results showed that the type of body fat distribution of postmenopausal women is of android type. Considering side effects of this kind of distribution, necessary teachings about healthy eating, movement and exercises must be given to women of these ages.

KEY WORDS: Waist circumference, body fat distribution, menopause, body composition.

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Today obesity can be considered as modern world's syndrome.¹ Now obesity is a chronic problem so World Health Organization considers the rapid increase in the prevalence of obesity as a pandemic and obesity and its issues as the main health problem in the world.² Therefore the need for using anthropometric indexes to identify its related risk factors has increased. Nowadays, besides anthropometric indexes like weight, height and body mass index, type of body fat distribution has an important role in identifying diseases too.¹ There are two types of body fat distribution: android (masculine) and gynecoid (feminine). There is also a middle pattern named avocado or ovoid which has the same side effects as android pattern.³ One of the ways to evaluate body fat dis-

tribution is to measure waist circumference index.

It is believed that having waist circumference more than 102 cm in men and more than 88 cm in women shows central fat distribution or apple shape obesity and considers as a risk factor for cardiovascular diseases, high blood pressure and diabetes.⁴ It seems that in postmenopausal women amount of fat mass would increase and its distribution would be changed from feminine to masculine.⁵ Menopausal changes that change the type of body fat distribution towards abdomen can't be described only with one factor but other factors are involved in it but still there are conflicting comments about involved factors.⁶ It is believed that in postmenopausal women although genetics is

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responsible for 60% of masculine type of body fat distribution, but environmental factors can change type of body fat distribution towards masculine too.⁷

In a study in 2003 it was mentioned that increase of waist circumference in postmenopausal women is a gradual process which starts before ending of bleeding and continues after menopause.⁸ Since android obesity nowadays is one of the important factors to predict different diseases like diabetes type II and cardiovascular diseases⁹ and increases the risk factor of breast cancer 1.5 times¹⁰ and also increases the prevalence of metabolic syndrome and colon cancer and hence increases morbidity and mortality,¹¹ therefore recognizing risk factors due to age is considered an important topic that should be noted¹² and since postmenopausal women are members of society and an interface between a group of community and continuity from generation to generation,¹³ hence promoting their health and needs in this era of can be considered as an important pillar of health care.¹⁴

As mentioned, by recognizing the type of body fat distribution in postmenopausal women and its related factors health care authorities could become aware to use intervention before occurrence of disease and programming and appropriate measures to bring this pattern of body fat distribution to optimal. So this study is aimed to distinguish the type of body fat distribution in postmenopausal women and its related factors.

Methods

This is a descriptive-analytical cross-sectional study. Samples (with accuracy of 0.5 and confidence of 95%) were 278 postmenopausal women from Isfahan city who were selected by stratified sampling and then invited to 100 health centers of Isfahan (which were selected randomly). Exclusion criteria were: having non-Iranian nationality, being under treatment for losing or gaining weight (pharmaceutical, physical, dietary), having known mental-psychological disorders (anorexia nervosa, bulimia nervosa, depression, bipolar disorder), having motion problems, using drugs like corti-

costeroid, levothyroxine, metamizole, propylthiouracil, danazole and estrogen and progesterone compounds and having known diseases like cushing, diabetes, hypo and hyperthyroidism, ulcer, duodenal ulcer, ulcerative wounded and cancers.

Data was gathered using standard meter and researcher made questionnaire which included questions about characteristic data and samples fertility and to determine its validity and reliability, content validity method and retest were used, respectively. For gathering data, 3 expert midwives who were selected as questioner called postmenopausal women who were under health care centers cover from 20 February 2006 to 10 May 2006 and invite them to health care centers for cooperation. Then considering inclusion and exclusion criteria, completed questionnaires and measured waist circumference (the narrowest part of waist circumference in the middle area of upper elevation of iliac bone and the end part of ribs following the middle axillary line) using the standard meter. Data was analyzed using descriptive (mean, standard deviation, minimum and maximum) and inferential (Pearson correlation coefficient, one way variance analysis, independent t test) statistics. The software which used in this study was SPSS version 13.

Results

The findings of the study showed that the mean of waist circumference index in postmenopausal women is 93.63 cm, its standard deviation is 10.66 cm and its minimum and maximum are 54 and 119 cm, respectively. Therefore the type of body fat distribution in postmenopausal women is android.

Considering characteristic and fertility data, results showed that there was a meaningful relation between job ($p = 0.016$) and educational status ($p = 0.007$) with waist circumference index (Table 1) which means that the mean (SD) of waist circumference index in housewives with 94.18 (10.22) was higher in comparison with women who worked at home with 91 (7.02), women who worked out with 81.25 (16.11) and women who were retired with 87.96

(15.37). Also waist circumference index in women with higher educational level (middle school, high school, academic) was lower than those who had low educational level (illiterate, elementary school).

Also results showed that there was a meaningful relation between waist circumference index and total pregnancies ($p = 0.003$), total deliveries ($p < 0.001$), age of first delivery ($p = 0.014$), lactation history ($p = 0.31$) and menopausal age ($p = 0.02$) (Table 1) in a way that waist circumference index in women who had 3 or more pregnancies and deliveries was higher than those who had less pregnancies and deliveries. Also waist circumference index in women who had their first delivery under age 20 was higher than those who had their first delivery after age 20.

On the other hand, waist circumference index in women with menopausal age of 50 or less was less than those with menopausal age of more than 50.

Also results showed that those who had lactation history had lower waist circumference index in comparison with others. But there was no meaningful relation between duration of lactation and waist circumference index.

There was no meaningful relation between other factors like age, age of last delivery, menarche age, the average length of menstrual cycles and number of years elapsed from menopause with waist circumference index ($p > 0.05$) (Table 1).

Discussion

Results of this study showed that regarding the mean of waist circumference index in postmenopausal women, type of body fat distribution in them is of android type.

The mean of waist circumference index in postmenopausal women of North America was reported 90 cm by Grievink in 2004¹⁵ and 93.3 cm by Irwin (2004).¹⁶ It seems that menopausal probably change body fat distribution and transfer it from gynecoid to android.⁶

Results of the present study showed that there is a meaningful relation between job and waist circumference index in a way that postmenopausal women who work outside home have lower waist circumference index.

Also Lahmann in a study conducted on Swedish postmenopausal women in 2000 showed that retired women and housewives have higher waist circumference index.¹⁷

It seems that women who work outside the home due to more social approach and thus more knowledge about undesirable side effects of body fats and abdomen obesity and controlling it have lower waist circumference. Also it is believed that these women have more physical activity and hence use ore energy in comparison with housewives, retired women or those who work at home. Therefore regarding women's educational status in different levels, different employment levels for them should be provided.

Table 1. Used tests and p values of relation between variables and waist circumference index

Variable	Test	p	Variable	Test	p
Age	Correlation coefficient $r = 0.057$	0.34	Total pregnancies	Correlation coefficient $r = 0.17$	0.003
Job	One way variance analysis	0.016	Total deliveries	Correlation coefficient $r = 0.24$	< 0.001
Educational status	Correlation coefficient $r = 0.16$	0.007	Age of first delivery	Correlation coefficient $r = 0.14$	0.014
Menarche age	Correlation coefficient $r = 0.17$	0.08	Age of last delivery	Correlation coefficient $r = 0.1$	0.07
Menopausal age	Correlation coefficient $r = 0.13$	0.02	Lactation history	Independent t-test $T = 2.17$	0.031
Average length of menstrual cycles	Correlation coefficient $r = 0.064$	0.28	Number of years elapsed from menopause	Correlation coefficient $r = 0.039$	0.51

Regarding educational status, results of the present study showed that with increase of literacy and educational level, waist circumference would be decreased.

In a study conducted in 2004 by Regidor et al on Spanish postmenopausal women, results showed that there is a reverse relation between android type of distribution and educational level.¹⁸ It seems that women with higher educational level due to more awareness and knowledge about complications and side effects of extra fat tissue have more concerns about their health and therefore pay more attention to their nutritional and behavioral programs.

Therefore there should be more effort to increase literacy and fight illiteracy especially in women and support the possibility of women's study in different academic levels including higher academic education. It seems that appropriate training during study (high school and university) and before getting married regarding undesirable body fat distribution and its related factors and side effects can be useful in preventing obesity after menopause.

Results of the present study showed that there was a direct meaningful relation between total pregnancies and deliveries and waist circumference index which means that those who had more total pregnancies and deliveries had higher waist circumference index.

Ness in a study in 1995 in Cuba showed that higher number of pregnancies is related to increased abdominal fat distribution (waist circumference index).¹⁹

It seems that with every pregnancy and delivery there would be some increases in abdominal fat distribution which can be effective on increase of waist circumference index.

Therefore using TV, newspaper and all mass media and also while providing health care for women during fertility ages in health care centers, necessary lessons must be given about limiting pregnancies and deliveries as an effective factor on abdominal fat distribution so that we could be in line with family planning policies in our country and also prevent undesirable fat distribution caused by repeated pregnancies and deliveries and then after menopause.

Results of the this study showed that there was a weak reverse relation between age of first delivery and waist circumference index. Generally after first pregnancy and delivery a mild but undesirable increase in abdominal fat distribution appears which probably could be aggravated due to low age at first pregnancy and appearance of body fat mass during puberty.

Therefore there must be more serious effects to correct fertility behaviors in the society (prevent pregnancy in low ages) by deputy county health officials, TV and all mass media and consulting and study classes before marriage.

Results of the present study showed a meaningful relation between lactation and waist circumference index which means those who had lactation history have less waist circumference index but there was no meaningful relation between duration of lactation and waist circumference index.

Regarding this matter Gigante (2001) believed that lactation is related to decrease of waist circumference index of mothers.²⁰ Therefore it is recommended that through mass media, health care personnel and marriage education classes and also in high schools and universities necessary studies should be given about lactation and its relation to body fat distribution so that increase of waist circumference and undesirable fat distribution after menopause could be somehow prevented.

Based on the present results there is a direct meaningful relation between age of menopause and waist circumference index which means the higher is the age of menopause the higher is waist circumference index. Therefore it is recommended to health care personnel and also physicians and midwives in their private clinics in dealing with women of 50 years old or more who still have not become postmenopausal to give necessary notifications and trainings on this matter (including physical exercises, having more mobility and having a right diet).

In conclusion considering that waist circumference index is one the simple and cheap anthropometric tools it is better that measurement of waist circumference index after delivery should be done repeatedly after pregnancies in health

care centers so that by controlling this factor severity of abdominal obesity could be prevented somehow.

The Authors declare that have no conflict of interest in this study and ethical committee approved the study.

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