

## The menopausal age and associated factors in Gorgan, Iran

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### Abstract

**Background:** Considering the physical, emotional and psychological complications of early or delayed menopause on women's life, it is necessary to determine associated factors of menopause age. This study designed to determine menopausal age and associated factors in women of Gorgan, i.e. the capital of Golestan province in the north-east of Iran.

**Methods:** In this cross-sectional study, 804 menopausal women in Gorgan were selected via two-stage sampling method in 2009. The study included only women who had undergone natural menopause and had their last menstrual bleeding at least one year before. Data were gathered through structured questionnaire that included individual characteristics, socioeconomic characteristics, menstrual and fertility characteristics and climacteric complaints. Socioeconomic status was defined using principal component analysis. Data were analyzed with T-student's and ANOVA tests using SPSS version 16 (SPSS Inc, Chicago, IL, USA) for Windows.

**Results:** The mean menopause age was  $47.6 \pm 4.45$  years with the median age of 48 years. The mean menopause age in women with first pregnancy before 30 years ( $47.58 \pm 4.47$  years), without pregnancy ( $46.26 \pm 4.90$  years) and without delivery ( $46.30 \pm 4.47$  years) was significantly lower than others ( $p < 0.01$ ). The mean menopause age was lower in single women ( $46.6 \pm 2.80$  years), with low income level ( $47.7 \pm 4.39$  years) and smokers ( $47.6 \pm 4.45$  years) compared to others; but these differences were not statistically significant ( $p > 0.05$ ). Socioeconomic status was not associated significantly with menopause age ( $p > 0.05$ ).

**Conclusion:** This study illustrated that menstrual and fertility factors have influence on menopausal age while socioeconomic factors were not effective.

**Keywords:** Menopausal age, socioeconomic status, Menstrual factors, Fertility factors, Climacteric complains, Iran.

### Introduction

Menopause is defined as discontinuation of menstruation for successive 12 months (1). Although it has constant mean and median the menopause in the recent century approves its occurrence as a phenomenon

affected by ethnic and genetic factors, and environmental factors (2-5). In some studies the role of some associated factors in defining menopausal time have been investigated in various nations which showed changes in life style and social status may

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affect menopause age as an inevitable occurrence in women's life (6-8).

According to the previous studies, menopause age in Iran is relatively within earlier ages compared to other countries (9-13). These differences imply that menopause age may be affected by environmental factors (4).

In spite of recent improvements in diagnosis of associated hormonal changes in menopause and accessible treatments for its symptoms, there is not considerable information regarding factors affecting its time. Based on the previous studies, factors such as smoking, nutrition, socioeconomic status, fertility rate and anthropometric factors can affect menopause age (4-16); however there is not a general consensus about all of them, but most of the studies confirmed role of smoking.

Some chronic diseases such as osteoporosis, cardiovascular diseases and some cancers are related to continuation of ovarian function; in the other hand early menopause can increase risk of cardiovascular diseases and osteoporosis, but endometrial and breast cancers have increased incidence rates in higher menopause ages (12). Thus the age of menopause as a result of ovarian dysfunction is important in epidemiology of these diseases.

In fact, the importance of menopause in family and society health is due to its complications in women and its health-threatening problems; however these complications are preventable. Considering to physical, emotional and psychiatric complications of early and delayed menopause, it is necessary to recognize associated factors of menopause to provide appropriate awareness and treatment before and after menopause.

## Methods

During 2009 in this cross-sectional population-based study, 804 menopausal women in Gorgan, north-east of Iran were selected via two-stage sampling method. In Gorgan there are 8 health-treatment centers and 12 health bases. First using cluster sampling

method, health centers and bases were selected and then required samples were recruited from each region via random sampling method. Verbal informed consent was obtained from participant. Ethical approval was obtained by research ethics committee of Golestan University of Medical Sciences (GOUMS). Data was gathered using a structured questionnaire which its content validity was approved by expert opinion (gynecologists' opinion and). In a pilot study on 30 subjects, a test-retest analysis with an interval of 10-14 days approved an excellent reliability with a Kappa coefficient of 0.82 and a correlation coefficient of 0.78. The questionnaire consisted of information about demographic data (age, sex, ethnicity, educational level, etc), socioeconomic characteristics, menstrual and fertility characteristics and climacteric complaints. Data were collected via interview with participant at home. The interviewer received necessary training on how to complete a questionnaire. The completed questionnaires were checked for consistency and completeness.

The study included only women who had undergone natural menopause and with their last menstrual bleeding at least one year in past and they settled in Gorgan at least for one year and experienced menopause in this city at age less than 60 years and were local resident. Whenever a woman was not willing to participate in the interview she replaced with a woman in the same place. If person reported lack of activities such as running, jogging, swimming, bicycling or walking at least 30 minutes at a time per day, we classified them as inactive person. The body mass index was calculated ( $BMI = \text{weight (kg)} / \text{height (m}^2\text{)}$ ). Smoking status (current smoker vs. non smoker) and physical activity were considered as binary variables. Early menopause was defined as menopause age with less than 40 years and menopause age more than 50 years considered as late menopause.

In order to construct socioeconomic status variable using educational level, woman and her husband's occupation and family

income principal component analysis (PCA) was applied. Persons were categorized into low, intermediate and high socio-economic status using 25% and 75% percentiles.

#### *Statistical analysis*

Results were reported as mean  $\pm$  standard deviation (SD) or median for quantitative variables and percentages for categorical variables. Data were analyzed by Student's t-test, ANOVA (using Tukey as post hoc), Chi square and Pearson correlation test. A p-value less than 0.05 was considered as statistically significant. All the statistical analyses were performed by SPSS version 16 (SPSS Inc, Chicago, IL, USA) for Windows.

#### **Results**

In this study 804 women at menopausal age were investigated including 127 "Sistani" women (15.8%), 56 "Turkaman" women (7.0%), 606 "Fars" women (75.3%) and 15 cases from other ethnicities (1.9%). The mean age of menopause was  $47.6 \pm 4.45$  years and the median age 48 years (range 30-60 years). Early and delayed menopause were detected among 10.1% and 19.25% of women, respectively. Regarding the occupation, 91.9% of the women were housekeepers (n=734), 3.0% (n=24), had a job and 5.1% were retired (n=41).

In this study, the association between body mass index (BMI) and age of menopause was investigated. Results showed no significant relation between the age of menopause and BMI ( $p > 0.05$ ). The results are summarized in Table 1.

In order to study the association between socio-economic status and age of menopause, socio-economic status was determined through Principal Component Analysis (PCA). Using this method, five dependent variables including female educational level (FE), male educational level (ME), female occupation (FO), male occupation (MO), and family income (FI) were summarized in one main component pre-

sented below:

$$\text{Principal Component} = 0.86 \text{ FE} + 0.85 \text{ ME} + 0.67 \text{ FO} + 0.54 \text{ MO} + 0.75 \text{ FI}$$

This component explained 72.0% of the variance. Pearson correlation test showed an increase in this component which was associated with the decrease in age of menopause, but the correlation coefficient was not significant ( $p > 0.05$ ).

Using the 25<sup>th</sup> and 75<sup>th</sup> percentiles of the principal component of socio-economic status, women in our study were categorized into three groups of low, intermediate, and high socioeconomic status. There was no significant difference in the age of menopause between these 3 groups ( $p > 0.05$ ). The association between family income and the age of menopause was separately examined, which revealed no significant association ( $p > 0.05$ ). Although the correlation in women with a history of smoking had lower menopause age, the association was not significant, neither with cigarette nor with tobacco smoking. No significant relation was found between menopause age and physical activity ( $p > 0.05$ ) (Table 1).

In this study a significant association was not found between menopause age, age of first delivery and menopause age ( $p > 0.05$ ). Number of pregnancies and deliveries were significantly associated with menopause age ( $p < 0.01$ ). An increase in number of pregnancies and deliveries associated with higher menopause age. Nonetheless, last pregnancy in older ages was significantly associated with higher menopause ages ( $p < 0.01$ ). In this study the mean age of menopause age was non-significantly lower in those who consumed oral contraceptive pills (OCP) compared to those who did not ( $p > 0.05$ ). Our results showed that menopause age was not significantly different between women with sudden changes in menstrual cycles and those with gradual changes in menstrual cycles ( $p > 0.05$ ). No statistical association was found between mean menopause age and menstrual duration, history of miscarriage, history of dilation and curettage, marriage age and dura-

Table 1. the association between menopausal age and demo-socio characteristics among women.

Variables	(%) n	Mean $\pm$ SD	p-value
Body mass index ( $k/m^2$ )			
<25	(20)161	47.6 $\pm$ 4.36	0.57
25-30	(40.8)328	47.4 $\pm$ 4.60	
>30	(39.2)315	47.8 $\pm$ 4.36	
Marriage status			
single	(0.4)3	46.6 $\pm$ 2.8	0.71
married	(99.6)800	47.6 $\pm$ 4.5	
Smoking (cigarette or tobacco)			
Yes	(0.5)4	47.6 $\pm$ 4.45	0.23
No	(99.5)785	50.25 $\pm$ 5.25	
Physical activity			
Yes	(14)113	47.66 $\pm$ 4.91	0.85
No	(86)691	47.58 $\pm$ 4.37	
Socioeconomic status			
Low	(22.3)128	47.70 $\pm$ 4.39	0.29
Moderate	(57.1)327	47.10 $\pm$ 4.10	
High	(20.6)118	46.88 $\pm$ 4.34	
Family income			
Week (<150,000)	(39.9)321	48.04 $\pm$ 4.2	0.07
Low (>1500,000, <300,000)	(29.6)238	47.1 $\pm$ 4.53	
Intermediate (>300,000, <500,000)	(21.8)175	47.4 $\pm$ 4.63	
High (>500,000)	(8.7)70	47.78 $\pm$ 4.72	

tion of breast feeding, regular menstrual cycle and twin pregnancy ( $p>0.05$ ), (Table 2).

### Discussion

In this study the mean age of menopause was 47.6 $\pm$ 4.45 years and the median age 48 years, which was relatively lower compared to other provinces studies in Iran (4,6,7,11, 12,14) and some other countries(8,17-22). The mean menopause age in this study was quite similar to the results reported in a study in Birjand, Iran (47.19 years) (13). These two provinces are geographically neighbors, which implies the impact of cultural and climate determinants on the age of menopause. The means menopause age reported from South Korea (21) and Pakistan (23) were lower than our findings. Thus, the impact of climate and cultural determinants should be considered in this context.

Our results revealed no statistical association between BMI and menopause age; however women with lower weight had earlier menopause. Meanwhile, there was no significant relation between height and weight with menopause age, which was consistent with a study by Reynolds et al in

Lebanon (24). However, other studies showed opposite results (11,22, 25,26). The discrepancy is probably due to differences in socioeconomic status, since most obese women have higher socio-economic status and hence the menopause age is higher among them.

No relation was found between the marital status and the age at menopause. An association might be expected between married and unmarried groups (27), but the limited number of the unmarried group ( $n = 3$ ) made the evaluation impossible. These results congruent with some previous study in Iran (4,7) and some other countries (15,16).

Based on finding, it is seen that the women who had low household income had earlier age at natural menopause than the others, and these differences were close to be statistically significant ( $p=0.07$ ). In some studies, it was shown that the low socioeconomic level may be effective on earlier age at menopause (28,29).

The variable that we created as an indicator of socio-economic status in this study did not show any significant association with menopause age ( $p>0.05$ ). The increase

Table 2. the association between menopausal age and menstrual-fertility characteristics.

variables	(%) n	Mean±SD	95% CI	p	between group p-value
Menarche age			47.1-48.27		
<12 years	(26.7)214	47.7±4.38	47.02-47.87	0.61	
>12, <14 years	(51.5)414	47.44±4.45	47.28-47.90		
>14 years	(21.8)175	47.82±4.57			
Age at first pregnancy			47.22-48.1		
<18 years	(58.4)469	47.65±4.73	47.04-47.93	0.86	
>18, <30 years	(40.2)323	47.48±4.07	45.89-49.73		
>30 years	(1.4)11	47.81±2.85			
Age at last pregnancy					
<sup>#</sup> <30 years	(47.9)385	46.95±4.65	46.47-47.40	<0.01	<sup>#</sup> p<0.01
<sup>##</sup> >30, <40 years	(47.9)385	47.96±4.2	47.54-48.34		<sup>#</sup> p<0.01
<sup>###</sup> >40 years	(4.2)33	50.78±2.79	49.79-51.77		<sup>##</sup> p<0.01
Number of pregnancy					
<sup>#</sup> 0	(1.9)15	46.26±4.9	43.55-48.97	<0.01	<sup>#</sup> p<0.01
<sup>##</sup> 1-4	(40.3)324	46.73±4.31	46.26-47.20		<sup>#</sup> p<0.01
<sup>###</sup> 5-9	(50.4)405	47.97±4.4	47.54-48.40		<sup>##</sup> p<0.01
<sup>####</sup> >10	(7.4)59	49.96±4.27	48.85-51.08		<sup>###</sup> p<0.01
Number of delivery					
<sup>#</sup> 0	(2)16	46.3±4.74	43.84-48.9	<0.01	<sup>#</sup> p0.04
<sup>##</sup> 1-4	(50.4)405	46.95±4.48	46.51-47.39		<sup>#</sup> p<0.01
<sup>###</sup> 5-9	(45.5)365	48.21±4.34	47.76-48.66		<sup>##</sup> p<0.01
<sup>####</sup> >10	(2.1) 18	50.35±2.8	48.91-51.80		<sup>###</sup> p0.01
OCP consumption					
Yes	(11.7)94	47.22±3.73	46.3-47.5	0.32	
No	(88.3)710	47.64±4.54	47-48.3		
Abortion history					
Yes	(24.4)195	47.7±4.84	47.36-48.04	0.53	
No	(75.6)607	47.54±4.35	47.36-47.7		
Pattern of last menstrual cycle					
Suddenly	(7.5)59	47.49±6.14	46.9-48.3	0.84	
Gradually	(92.5)727	47.46±4.27	47.5-47.8		
Marriage age					
<15 years	(45.6)367	47.8±4.64	47.32-48.27	0.48	
>15, <20 years	(40.7)327	47.4±4.24	46.93-47.85		
>20 years	(13.7)110	47.5±4.24	46.66-48.33		
Dilatation and curettage					
Yes	(1.6)13	49.4±2.7	47.92-50.88	0.14	
No	(98.4)791	47.56±4.47	47.26-47.86		
Twin pregnancy history					
Yes	(2.9)23	48.4±3.9	47.6-49.2	0.40	
No	(97.1)776	47.58±4.46	47.74-47.42		

in the values of this variable was not associated with an increase in menopause age. This result was not in accordance with previous studies (6,8,19,21,26). The components of socio-economic status in our study were not the same as those used in previous studies and this might explain the observed differences to some extent.

Although women who were current or past smokers had lower menopause age, but no significant association was found between menopause age and smoking (cigarette or tobacco). Pokoradi and et al found that current smokers reached menopause at

a significantly younger age than nonsmokers (30). Only four women in our study had a history of smoking, which made it hard to compare our results with other studies. Our results in accord with previous findings illustrated no relation between menopause age and physical activity (6,12,22,27).

Earlier age at menarche was not associated with earlier menopause age. In contrast, one study in turkey has reported significant correlation concerning this relation (31) but studies concerning this relation are controversial (32,33).

Our study confirmed a significant associa-

tion between menopause age and age of last pregnancy; however, higher age of last pregnancy was associated with delayed menopause. This finding was similar to those previously found in Shiraz (9) and Birjand (13), but different from a number of studies in Italy (22) and Poland (20). Moreover, there was a significant association between number of pregnancies and deliveries with menopause age; higher number of pregnancies and deliveries was associated with higher age of menopause. This finding was similar to studies in Yazd (7), and Poland (20). Excess activity of ovaries and uterine and breastfeeding which are related to progesterone and estrogen levels can affect menopause.

The mean menopause age was not significantly different between participants who consumed OCP and those who did not. In contrast, previous studies in Birjand (13), Ahvaz (11), Shiraz (19) and Poland (20) had reported that OCP consumption can be associated with delayed menopause age.

Menstrual cycle duration, history of miscarriage, history of curettage, age of marriage, and duration of breastfeeding were found to have no significant association with menopause age, which is in accord with previous studies in Shiraz (9), Yazd (7), Meshhad (12) and Birjand (13). A previous study in Poland (20) showed that longer menstrual cycle was associated with earlier menopause. In our study, women with longer menstrual cycles had earlier menopause, but this association was not statistically significant. It should be mentioned that some studies have showed that women with shorter menstrual cycle have earlier menopause by at least 1-2 years.

In summary, in this study socio-economic status was not found to have any relation with age of menopause, which was in contrast with some previous studies (4,6,15, 20). In comparison to other provinces and cities in the country, age of menopause was lower among women in Gorgan. Cultural and ethnic differences can be among important determinants. Golestan province is a region with high genetic and ethnic hetero-

geneity. Thus, genetic and ethnic heterogeneity should be considered as determinants of menopause age which requires further investigation.

One of main important limitation of our study was being cross-sectional and recall-bias about the associated factors due to the duration. Trained interviewers were used to restrict this limitation whenever it was possible.

### Conclusion

Undoubtedly, the phenomenon of menopause is inevitable. According to finding the mean age menopause of the study participant was lower than other provinces of Iran and some other countries. This study illustrated that menstrual and fertility factors have influence on menopausal age while socioeconomic factors were not. Therefore, according to the consequences of menopause and lower menopause age, the women in this study environment require special attention.

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