

# Menopause Age and the Associated Factors in Postmenopausal Women in Babol, Iran

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## ABSTRACT

**BACKGROUND AND OBJECTIVE:** Menopause plays a pivotal role in women's life comprising of approximately one third of it. Nevertheless, few studies have focused on the significance of this period. This study aimed to determine the age of menopause and its associated factors in postmenopausal women in Babol, Iran

**METHODS:** This cross-sectional study was conducted by cluster sampling on 300 postmenopausal women identified by doorstep questioning of the homes in selected areas. The questionnaires consisted of information on the menopause age, body mass index (BMI), age at menarche, first pregnancy age, duration of hormonal contraceptive use, left-handedness, occupation, menstrual regularity, exercise, smoking habits, couple's education degree, marital status, family size and the number of births and abortions. The collected data were registered into checklists and The Holmes & Rahe Stress Scale was used for the assessment of the variables.

**FINDINGS:** In total, the average age of menopause was  $50.02 \pm 0.21$  years, the average length of marriage was  $42.10 \pm 0.63$  years, age at last pregnancy was  $35.15 \pm 0.35$  years and the lactation duration was  $106.02 \pm 3.5$  months. A significant correlation was found between the length of marriage, age at last pregnancy, stress scores, lactation duration and the menopause age ( $p < 0.001$ ), while some factors such as BMI, regulation and age at menarche, duration of hormonal contraceptive use and exercise were found to have no significant correlations with the onset of menopause.

**CONCLUSION:** According to the results of this study, the mean age of menopause in Babol is within the normal range and it is associated with the length of marriage, age at last pregnancy, stress scores and lactation duration.

**KEY WORDS:** Menopause Age, Pregnancy, Menstruation.

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## Introduction

Reproduction periods like the reproductive age at menarche, first pregnancy and the menopause play a pivotal role in a woman's life (1). Natural menopause, as defined by the World Health Organization (WHO), is the cessation of menstruation in women due to the ovarian follicular activity for at least 12 consecutive cycles which is not associated with pregnancy, lactation or other hormonal disorders (2-8). However, amenorrhea along with decreased levels of estrogen and follicle stimulating growth hormone (FSH) greater than 40 milliunits per liter also represent the onset of menopause in laboratory terms (5, 7).

Since the life expectancy of women has risen to 70-80 years according to various sources, every woman spends about a third of her life (20-30 years) in the postmenopausal stages (1, 2, 4, 7, 9, 10). The average age of menopause in industrial societies is 50-51 years and approximately 40% of women reach natural menopause before the age of 40 (premature menopause) (11, 14). However, the scope of the changes in menopause in Iran accounts for a relatively large age range of 46-52 years (1-3, 6, 8, 12, 14, 24, 25). Approximately 25 million women in the world reach menopause every year. Thus, with an annual increase of 47 million new cases per year, it is expected that this rate will reach one billion and 200 million people by 2030 which is a dramatic growth in the world's elderly population (1, 14). The average age of menopause in America and Ankara, Turkey is estimated as 51.4 (18-20) and  $47 \pm 4.2$  years, respectively (1) and it is  $49 \pm 3.6$  and 49.6 years in Lahore, Pakistan (1) and Iran (17), respectively. In a number of studies, the average age of menopause in Tehran, Iran was estimated as  $48.51 \pm 4.45$  and  $49.6 \pm 4.5$  years in 2003 and 2012, respectively (4, 25). In addition, the average menopause age was  $48.2 \pm 3.7$  years in Mashhad (13),  $53.2 \pm 5.7$  years in Shahrood (3),  $47.97 \pm 4.17$  years in Ahwaz (5),  $46.34 \pm 3.69$  years in Gonabad (24) and  $47.93 \pm 4.37$  years in the region of Mazandaran (9). For many women in different societies, menopause is followed by a particular feeling of anxiety and confusion. In the view of the fact that women constitute a significant part of a community and half the population of the world, having adequate knowledge of the age of menopause onset could set the foundations for regulating more efficient health policies as to improve women's quality of life (2, 4, 6).

Identifying the mean age of menopause is regarded as a health indicator of the nutritional and socioeconomic status of a society (5). In fact, the

importance of considering menopause in family and community health is due to the complications it causes in women and the problems which might be threatening to their health, while these complications are believed to be easily preventable (1).

According to several studies, many factors are associated with menopause including age at menarche and menopause, nutritional and socioeconomic status, number of childbirths and abortions, use of hormonal contraceptives, race, religion, breastfeeding, education degree, physical characteristics such as left-handedness, consumption of alcohol and tobacco, addiction of any kind, age at first and last pregnancy, physical exercise and sexual behavior. However, conflicting results have been reported on the precise effects of these factors (1-5, 20-22).

For instance, in a research conducted in Tehran in 2006, using birth control pills was found to reduce the age of menopause. However, the same agent was associated with the late onset of menopause in another study performed in Ahwaz in 2001-2002 (1, 5). On the other hand, menopause, as a marker of the end of the reproductive period, has not been adequately studied compared to other periods of women's life (1, 5, 6, 14). Since the city of Babol was not included in a survey conducted on this subject in the region of Mazandaran (2003) (9), the present study aimed to determine the age of menopause and its related factors in postmenopausal women of 46 and older in Babol so that the results would help provide the health care services required by these women while laying the grounds for future research.

## Methods

This cross-sectional study was conducted in Babol in 2012 by cluster random sampling. After obtaining approval from the Health Department of Babol University of Medical Sciences, 300 postmenopausal women were surveyed at the selected houses covered by health care centers. Those who were willing to participate in the study were enrolled. The selected subjects had gone through at least one year of their natural menopause, were ageing 46 years or older and were sober, speakers of Persian or Mazandarani and finally, they were partially aware of their menstrual and reproductive history. The exclusion criteria of this study were the history of Hysterectomy, ovariectomy, underlying diseases such as diabetes and thyroid.

Regarding the fact that the average age of menopause in Mazandaran in 2003 was estimated as

47.93 years (9), the sample size consisted of 300 individuals by a 95% confidence level and an absolute error of 0.05. According to the information obtained from the Central Health Department of Babol, this city has 14 major health care centers 6 of which were selected randomly for this study. Since the majority of these health care centers are located in the Southern and Eastern part of the city, 2 centers were selected from each part, one center was selected from the Northern and Western part each and 50 samples were chosen from each center. In the most recent map of Babol, the city is divided into the geographical regions of North, South, East and West in each of which random cluster sampling was performed. Following that, households in these parts were surveyed in order to identify postmenopausal women. The average length of the interview was 15 minutes during which the weight, height and blood pressure of the postmenopausal women were measured and recorded by the researchers. Informed consents were provided from the subjects and the interviews were conducted anonymously. The individuals' information remained confidential and the obtained results were only reported to the associated organization.

The collected data were registered in checklists consisting of three sections. The first section contained the demographic characteristics of the samples, the second part included their age at menopause and the third part included the related factors related to the menopause age.

The variables associated with menopause in these checklists included the age at menopause, length of marriage, age at menarche, age at first and last pregnancy, blood pressure, body mass index (BMI), length of using hormonal methods of birth control, left-handedness, occupation, spouse's job, menstrual regularity, exercise, smoking habits, couples' education degree, marital status, family size, number of births and abortions and the stress level. The level of stress was measured by the standard questionnaire of Holmes & Rahe whose reliability and validity was evaluated in a study by Ardakani et al (A study of the Relationship between Preterm Delivery and the Stress caused by Life events during Pregnancy) (23). Furthermore, the Holmes and Rahe Stress Scale (1967) was principally used as a criterion for interpreting the changes and vulnerability to stress-related illnesses. In this questionnaire, scores of 150 or lower represent small changes in life in which the possibility of falling sick is also lower, the scores of 150-300 imply that health problems may occur by a probability of 50% within the

next two years and scores above 300 are indicative of an increased chance of diseases by 80%. The subjects were surveyed with emphasis on the events before the onset of menopause. In order for that, the participants were asked to recall the two years before the onset of their menopause while answering the questions. The collected data were analyzed by SPSS software V.18, Logistic regression tests, Linear regression and Chi-square. A P value of <0.05 was considered as significant.

## Findings

In this study, 300 postmenopausal women were studied whose average age of menopause was  $50.02 \pm 0.21$  years. The mean length of marriage, age at menarche and age at first and last pregnancy were  $42.10 \pm 0.63$ ,  $13.29 \pm 0.71$ ,  $19.55 \pm 0.24$ , and  $35.15 \pm 0.35$  years, respectively. No statistically significant differences were observed between age at menopause, BMI, age at menarche, age at first pregnancy, length of hormonal contraceptive use and the mother's age at menopause. Furthermore, no statistically significant correlation was found between the menopause age and other investigated factors such as left-handedness, occupation, spouse's occupation, menstrual regularity, exercise, smoking habits, the couple's education degree, marital status, family size and the number of births and abortions. In addition, 1% of the subjects were single, 87.3% were married, 10.3% were widowed and 1.3% were divorced or separated. The mean age at menopause in left-handed and right-handed subjects did not differ significantly. The average age in these subjects was reported to be  $49.27 \pm 4.52$  and  $50.08 \pm 3.57$  years in the right-handed and left-handed women, respectively.

The mean age of menopause in employed women was  $50.1 \pm 3.68$  years, it was  $49.60 \pm 3.42$  in housewives,  $49.89 \pm 3.78$  in women whose spouse was a clerk, and  $50.11 \pm 3.6$  in women with self-employed spouses. This finding suggested that the couple's occupation had no significant association with the onset of menopause. Approximately 95.3% of the surveyed women had regular menstrual cycles before menopause with an average menopause age of  $50.09 \pm 3.63$  years while this average in the women without menstrual regularity was reported to be  $48.50 \pm 3.8$  years which indicated no statistically significant association.

The average menopause age in athletic and non-athletic postmenopausal women was reported to be  $49.49 \pm 3.52$  and  $50.12 \pm 3.66$ , respectively which

indicated no statistically significant association. The average age of menopause in the subjects' mothers was  $49.07 \pm 4.37$  years and although the average age of menopause in their sisters was associated with the subjects' menopause age ( $p=0.012$ ), it had no significant associations with the average age of menopause in their mothers (table 1).

**Table 1. Association of the average menopause age with the variables examined in the study population**

Variable	Menopause average age(year) Mean±SD	P-value
<b>Exercise</b>		
athletic	49.49±3.52	0.269
non athletic	50.12±3.66	
Mother’s age menopause	49.07±4.37	
<b>Habits smoking</b>		
Smoker	47±20	0.15
smoker-non	50.05±3.64	
Handed-right	50.08±3.57	0.321
Handed-left	49.27±4.52	
Average sisters’ age menopause	49.84±4.37	
<b>Occupation</b>		
Employed	50.1±3.68	0.393
Unemployed	49.60±3.42	
<b>Spouse’s</b>		
Occupation clerk	89.49±3.78	0.636
Employed-self	50.11±3.6	
<b>Mensrual regularity</b>		
Regular	50.09±3.63	0.139
Irregular	48.50±3.8	

Moreover, such factors as high blood pressure, length of marriage, age at last pregnancy, lactation period and stress scores were found to be associated with menopause ( $p<0.001$ ). According to further statistical findings, menopause age increased by 1.178 years ( $p<0.01$ ) per a one-unit increase in the blood pressure, 0.8 year ( $p<0.001$ ) per a one-year increase in the length of marriage and 0.1 year ( $p<0.001$ ) per a one-year increase in the age at the last pregnancy. The average age of menopause in the three categories of Holmes et al stress questionnaire was reported to be  $50.74 \pm 3.48$  years (low stress),  $49.73 \pm 3.40$  (average stress) and  $48.69 \pm 4.22$  (high stress), respectively. There was a significant difference in the age of menopause between at least two of these groups. Additionally, the

results of the statistical tests indicated that there was a significant difference between Group 1 (low stress) and 3 (high stress) (table 2).

**Table 2. Frequency and menopause age based on the variables of the postmenopausal women's stress scores**

Variable	N(%)	Menopause age Mean $\pm$ SD	pvalue
Stress	300(100)		
Low	131(44)	$50.74 \pm 3.48$	0.001
Average	121(40)	$49.73 \pm 3.40$	
high	48(16)	$48.69 \pm 4.22$	

## Discussion

According to the results of this study, the overall mean age of menopause in Babol was  $50.02 \pm 0.21$  years which is equal to the average age of menopause in other industrialized countries in the world (5). The average age of menopause in the capital cities of Iran (Tehran, Arak, Mashhad and Ahwaz) was estimated as 48.48, 48.2, 48.2 and 47.97 years, respectively (1, 5, 6, 13). The inconsistencies found in various studies are possibly due to the differences in the climate, social and racial status as well as the subjects' lifestyle. Recently, genetic factors have also been proposed as the most important determiners of the age at natural menopause (11).

According to the present study, the length of marriage was positively correlated with menopausal age, such that for every increase by one year, age at menopause went up by 0.8 year. However, a study conducted in Tehran did not confirm these findings (1, 14) due to the differences in the samples' time range of marriage. The findings of this study also indicated that for every 1 unit increase in the blood pressure, menopause age would go up by 1.178 years. Similarly, Abdollahi et al observed a relationship between systolic blood pressure and menopause in a study performed in Mazandaran, as women with a late menopause experienced a higher systolic blood pressure (9). This relationship may also suggest the influence of sex hormones on blood pressure, or vice versa. According to the findings of our study, there was no association between BMI and age at menopause, and this finding is corroborated in similar studies in Arak (6), Tehran (1) and Shiraz (11), while a study in Ahwaz by Noh Jah et al (5) indicated that BMI above 20 is associated with a delayed age of menopause. On the other hand, we found that age at menarche and at menopause were not

significantly correlated which corresponds to the results of Nough Jah et al in Ahwaz (5). In a review by Tavassoli et al in Mashhad, such a relationship was not reported either (12). Since the age at menarche and menopause mark the beginning and the end of productivity in women and they are both formed by hypothalamic-pituitary-ovarian axis, lack of correlation between these two factors is unlikely. For more definite statements about the relationship between these two, further specialized studies are required. According to the results of the current study, there were no correlations between age at first pregnancy and menopause age, while the relationship with age at last pregnancy was so highly significant that for every increase in age by one year at the last pregnancy, the menopause age would go up by 0.5 year. A study in Mazandaran by Abdollahi et al (9) reported that women of elder age at their last pregnancy may also reach menopause later in life. This association is confirmed by another study conducted in Arak as well (6). In this regard, there can be two possibilities: first, that an elder age at menopause is the main cause of late pregnancy, and secondly, it is likely that the hormonal effects on the ovarian activity stimulation after pregnancy could be followed by a delayed menopause. However, in their research performed in Tehran, Nahidi et al suggested that the association between age at first pregnancy and menopause was not statistically significant (14).

For another thing, the total length of lactation and menopause were found to be significantly associated in the current study while the studies of Ahwaz (5), Kashan (10) and Mashhad (13) did not report any such statistically significant association in this regard. This significant correlation is most probably due to the impact of breastfeeding on the number of menstrual cycles. Perhaps this inconsistency in results comes from the differences between the samples' duration of lactation in various studies. In the study of Mazandaran, a significant correlation was also found between the length of lactation for the last child and the age of menopause (9). This factor has not been widely examined in other studies, so it requires further investigation. In our study, the duration of hormonal contraceptive use was found to have no correlations with the menopause age and similar studies of Ahwaz (5), Arak (6), Mazandaran (9) and Kashan (10) did not report of such a relationship either. However, Tavassoli et al observed a significant correlation between the menopause age and the use of oral contraceptives. This inconsistency appears to be due to the differences in the

mean duration of hormonal contraceptives compared with other methods of contraception. Our findings indicated that women's age at menopause had no significant relationships with that of their mothers' which was not compatible with the findings of a study by Ashrafi et al in Tehran (1).

On the other hand, our study suggests that there is a correlation between the sisters' average age of menopause and that of the studied subjects. According to the results of Mazandaran (9) and Kashan (10) studies, a significant relationship was observed between the mother's and the sister's menopause age and that of the subjects' which is probably because our samples were more aware of their sisters' age at menopause than that of their mothers'.

The findings of the current study confirmed no significant differences between the mean age of menopause in either the left-handed or the right-handed subjects, which is similar to the studies of Arak (6), Mazandaran (9) and Shiraz (11). Apparently, the absence of any correlations in our study in this regard could be due to the limited number of left-handed subjects (7.3%) compared to the right-handed ones (89.7%). Moreover, the postmenopausal women's occupation and education degree as well as those of their husbands were found to have no significant association with menopause in the current study. Similarly, Abdollahi et al in Mazandaran (9), Kafaee et al in Kashan (10) and Tavassoli et al in Mashhad (13) reported no such correlation while the study of Arak described the household income as a significant variable involved in the average age of menopause by a 5% error level (6).

In their research, Nahidi et al stated that such factors as primary levels of education or lower, husband's low education degree (elementary education or illiterate) and the state of being a tenant had a significant statistical correlation with the age of menopause (14). A study by Ayatollahi et al in Shiraz (11) indicated that the average age of menopause in women with low income or coming from the underclass of the society was lower compared to other subjects. Such factors appear to lack in the present study due to the limited number of educated samples (postmenopausal women above diploma accounted for 8.3% and husbands with education higher than diploma accounted for 16.7%). Another study in Arak (6) considers the level of income as a major factor while disregarding the education degree to be associated with the menopause age. In our study, 95.3% of the postmenopausal women had



regular menstrual cycles. The mean age of menopause in women with regular and irregular menstrual cycles was not significantly different. The studies of Arak (6), Mazandaran (9) and Mashhad (12) also support this finding while Nough Jah et al from Ahwaz (5) link monthly regular periods during the reproductive age to the early onset of menopause. Ashrafi et al from Tehran (1) also found that women with a regular menstrual pattern reach menopause significantly later. The follicular atresia in irregular cycles might be higher and this inconsistency was most likely due to the limited number of samples with irregular cycles in the present study. Of the 300 samples in our study, only 49 women practiced continuous professional sports or had regular physical exercise. Therefore, we concluded that exercise and menopause age had no significant association. The study of Ayatollahi et al in Shiraz (11) corroborated these findings, while physical exercise was a significant factor in women's menopause age in the study of Rafee et al in Arak (6). This inconsistency in the results is probably due to the larger number of the athletes in other studies compared to our study. Smoking habits were another non-related factor to menopause in this study where only 1% of our cases had a history of smoking. Ayatollahi et al (11) also confirmed this finding in their research, while the results of two similar studies (5, 14) considered a history of smoking cigarettes and hookah to be significantly associated with the early onset of menopause.

This significant association could be due to the effect of the nicotine content of cigarettes on the eggs and their estrogen secretion. The inconsistencies in these findings might be due to the differences in the consumption of tobacco in different cities. One of the main reasons of the absence of such significant relationship in this regard is probably the unpopularity of smoking habits among Iranian women compared to other countries. For another thing, the marital status of postmenopausal women in the current study was found to have no statistically significant association with the menopause age.

Although the majority of other studies do not support this finding (6), the findings of Nough Jah et al (5) and Ayatollahi et al (11) confirm this result. The household size and the number of pregnancies were also among the factors with no association with the mean age of menopause in our study. In another study (13), it was

observed that menopause had no significant correlations with the number of the children. Moreover, Kafaee et al (10) did not confirm such association between the number of births and menopause, while similar studies (1, 5, 6, 9) all focused on the relationship between the number of births and the age of menopause. Our findings also indicated that having a blood relation with the spouse had no statistically significant association with the onset of menopause. Ayatollahi et al (11) claimed that the average age of menopause in women who had blood relations with their husbands was comparatively lower. However, this association was not considered to be statistically significant. Among the subjects of the present study, 41 women had a blood relation with their spouse while 256 women did not. This particular variable has not been examined in other studies and realizing its precise impact requires further investigation.

The stress scores were among the studied factors known to influence the menopause age in the present study while the study of Mazandaran (9) does not support this finding. This variable has also been inadequately investigated and requires further research. In summary, the results of the current study indicated that the mean age of menopause in Babol was higher compared to other parts of the country while being within the normal range.

With reference to the inconsistencies in different studies, further investigation is to be made for a more accurate assessment of the associated factors with the age of menopause. It is also noteworthy that in the current study, more than 20 factors were closely investigated which could lay the grounds for future studies on the menopause age and its correlated factors.

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