Age at Menopause and Associated Factors in Central Anatolia; Turkey

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OBJECTIVES: This cross-sectional study is carried out in order to assess the mean age of menopause and the factors affecting it in Kayseri, Central Anatolia, Turkey.
STUDY DESIGN: Study subjects were 713 postmenopausal women between the ages of 40–65 years. Women declaring at least one year of amenorrhea were accepted as being in menopause. Data were collected using a questionnaire including questions about demographic, reproductive and socioeconomic factors. Logistic regression analysis was used to assess confounding factors on the age at menopause.
RESULTS: The mean and median age at menopause was 46.5±4.9 and 47, respectively. Of the total 713 participants, 632 women (88.6%) were found to be in natural menopause and 11.4% were in surgical menopause. Mean age for natural menopause was 47.0±4.6. The prevalence of early menopause occurring before the age of 46 years was found as 36.1% in the natural menopause group. Cessation style of menses, socio-economic status, menopausal ages of mothers and sisters were statistically correlated with the age at menopause. Low and middle socio-economic status and spontaneously cessation style of menses had statistically significant correlation with early menopause.
CONCLUSION: The mean age at natural menopause was 47.0±4.6 which is earlier than women in the western or industrialized countries.

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Key Words: Menopause age, Related factors, Turkish women

Introduction

Menopause is a physiological event of a woman's life.[1] It is defined as the permanent cessation of menstruation due to loss of ovarian follicular function and subsequent deficiency of endogenous estrogen.[2] With the general increase in life expectancy in many parts of the world, many females are likely to live for another 20-30 years after menopause and spend approximately one-third of their lives in a state of estrogen deficiency.[3] Estrogen has important effects on many different tissues and organs.[1] Because of this reason, menopause age has gained great importance. The risk of osteoporosis, malignancies, cardiovascular and genitourinary diseases [4] tend to be higher for women with an earlier menopause.

Age at menopause varies between 45 and 55 years all over the world. In developed countries, the mean age at menopause is around 50 years [5] whereas in developing countries it is around 47 years.[6,7] The determinants affecting the age of natural menopause remain unknown and vary from one population to another. It is generally accepted that both the number of oocytes formed during fetal development and the rate of ovarian follicular atresia during the life is important.[8] Little is known about the factors affecting the rate of atresia.[9] So identifying determinants associated with early onset of menopause are important. In this study, we analyzed the mean age at menopause and study the factors influencing its onset.

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Material and Methods

Study population and questionnaire

This study was a cross-sectional survey conducted in Kayseri, Turkey, in 2006. Kayseri is one of the biggest cities with a total population of approximately one million located in the middle Anatolia region of Turkey, which is an important commercial and industrial centre. Of the total population 49% (567483) were women and 23.5% (133358) were aged 40-65. We calculated our number of sample as 737 assuming that 35% of the survey population would be postmenopausal (10) with a significant level of 0.05 (alpha), 1-b (power)= 0.80 with a false rate of 0.05(d). For this reason the sample size was established as 740 postmenopausal women.

The sampling design of the study was a multistage probability sampling. In the first stage of this study, 14 primary health care centers were selected from 40 primary health care centers located in Kayseri Health Group Area by using simple random sampling method. In the second stage the primary health care centers were weight according to their population intensity and women were chosen randomly by 1/4 systemat-

ic sampling method using individual health charts.

In this study 713 postmenopausal women between the ages of 40-65 years were analyzed. The rate of reaching the sample was 94,6%. Twenty four women were excluded from the research because some refused to give information, some was not at home and data was incomplete in some women's questionnaire. Natural menopause and surgical menopause were included in the study. Menopausal status of the women was defined according to WHO definition.[3] Women experienced amenorrhea for 12 or more consecutive months were considered to be in natural menopause. Women with a history of surgical removal of both ovaries (with or without hysterectomy) were considered to be in surgical menopause. Early menopause was defined as onset of menopause before the age of 46 .[11,12] Parity was defined as the number of live births after seven months of pregnancy. The socioeconomic level is classified. Minimum wage for our country in 2006 was 350 New Turkish Lira (NTL) and poverty level was 1 000 NTL that the socioeconomic levels were defined according to this wage and level. Low socioeconomic level defines wage under 350 NTL, moderate socioeconomic level defines wage between 350-1000 NTL, high socioeconomic level defines wage higher than 1000 NTL.

Data was collected by a questionnaire using the face-to-face interview technique. Last year medical students performed interviews in women's homes. The questionnaire consisted of a series of questions concerning age at menopause, socio-economic status, onset of menarche, age at first pregnancy, regularity of menstrual cycles, parity, duration of breast feeding, use of oral contraceptives (OCs) and smoking habit. Height and weight of all the participants were recorded and body mass index was calculated by using the formula weight (kg) /height (m^2). Women were also asked whether they knew the age when their mothers and old sisters attained menopause.

Data Analysis

Values are expressed as mean±SD, median (min-max). Natural menopause age according to characteristics in the studied women was evaluated by Mann Withney U test and the Kruskal Wallis test. Univariate and multiple logistic regression (Method:Backward-Wald) was used to identify the factors influencing early natural menopause. Years of education completed, smoking habit, use of oral contraceptives, body mass index, parity, duration of breastfeeding, age at menarche, regularity of menses, cessation style of menses, household income, menopausal age of mother and sister were taken as categorized independent variables. Mothers and sisters menopausal age were not included in the multiple logistic regression analysis because most of the women couldn't remember these ages. Pearson Correlation Analysis was used to evaluate the association between the mothers and sisters menopausal ages and the women's menopausal ages. Statistical significance was defined as $p<0.05$. All analyses were performed with the statistical package for social science (SPSS) version 13.0 (Chicago, Illinois).

Results

A total of 713 women were investigated. The mean age of the study group was 54.4±6.1 years. Majority of women were married (81.3%), housewife (98.7%), low educated (61.4%), never smoked (88.6%), never used oral contraceptives (71.2%), overweight (45.7%) and breastfeed over one year (84.6%). There were two never married women in the group. Majority of women (55.0%) had four or more parity. Mean parity was 4.1±2.0. Of the total 713 women, 632 (88.6%) were in natural menopause and 81 (11.4%) in surgical menopause. Mean age at menopause was 46.5±4.9 years and median age was 47.0 years. Mean years since menopause was 8.0±6.4. Table 1 shows mean, median, minimum and maximum values of age at menopause according to menopause status and figure 1 shows frequency distribution of the age at natural menopause.

Table 1: Mean, median, minimum and maximum values of age at menopause according to menopause status

Menopausal status	n	Mean age ±SD (95% CI)	Median age	Min-Max (years)
Natural menopause	632	47.0±4.6 (46.6-47.3)	47	35-59
Surgical menopause	81	42.8±5.8 (41.5-44.1)	43	29-55
Total	713	46.5±4.9 (46.1-46.9)	47	29-59

CI: Confidence Interval, Min-Max: Minimum-Maximum

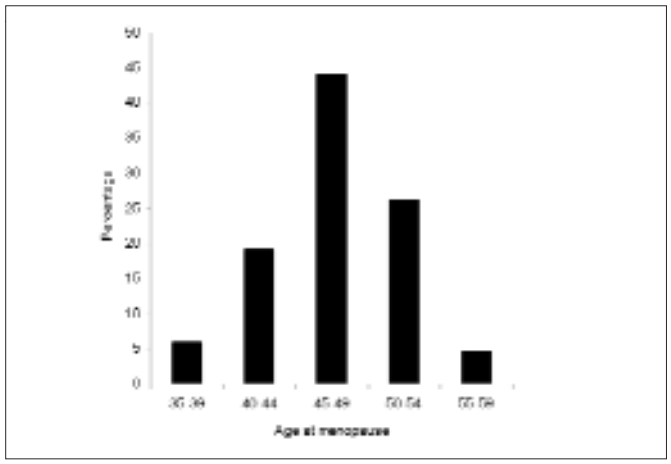

Figure 1: Frequency distribution of the age at natural menopause.

Association between age at natural menopause and some demographic factors were analyzed (Table 2).

Table 2: Association between age at natural menopause and some demographic factors

	n	Median (Min-Max)	p
Characteristics			
Employment status			
Employed	7	47.0 (35-59)	0.571
Housewife	625	48.0 (46-50)	
Education (years)			
<5 years	395	48.0 (35-59)	0.225
> 5 years	237	47.0 (35-56)	
Smoking habit			
Past-current	68	47.0 (36-55)	0.314
Never used	564	48.0 (35-59)	
Age at menarche			
<13 years	321	47.0 (35-59)	0.744
>14 years	311	48.0 (35-59)	
Age at first pregnancy			
<20 years	354	47.0 (35-58)	0.189
20-29 years	249	48.0 (35-59)	
>30 years	6	48.5 (45-57)	
Parity			
0-1	37	46.0 (35-55)	0.427
2-3	235	47.0 (35-59)	
> 4	360	48.0 (35-59)	
Duration of breastfeeding			
< 1 year	113	48.0 (35-57)	0.927
> 1 year	519	47.0 (35-59)	
Use of oral contraceptives			
Yes	170	47.5 (35-59)	0.893
No	462	47.0 (35-59)	
Lifelong menstrual cycles			
Regular	470	48.0 (35-59)	0.801
Irregular	162	47.0 (35-59)	
Cessation style of menses			
Spontaneous	230	47.0 (35-59)	**0.000**
Irregular menses before cessation	402	48.0 (35-59)	
Socio-economic level			
Low	73	45.0 (35-57)	**0.016**
Moderate	498	47.0 (35-59)	
High	61	48.0 (37-56)	
Menopause age of mother (n=188)*			
> 45 years	81	46.0 (35-55)	**0.000**
> 45 years	107	49.0 (37-56)	
Menopause age of sister (n=138)*			
> 45 years	53	46.0 (35-56)	**0.000**
> 45 years	85	49.0 (37-55)	
Body Mass Index			
20-24,9	166	47.0 (35-59)	0.157
25-29.9	291	48.0 (35-59)	
30 and over	175	48.0 (35-58)	

* *Number of women remembered*

The association between cessation style of menses, socio-economic level, menopause age of the mother and old sister and age at menopause were found significant.

The mean age at menopause for women who reported spontaneous cessation was 45.9±4.9 years compared 47.6±4.3 years for women irregular of menses before cessation. The onset of menopause in low socio-economic group was found to be earlier than the other groups. The association between the marital status and menopause age was not evaluated because of the limited number of never married group (n=2). Out of 632 natural menopause women 26.9% had used OCs in a part of their life and the mean duration of using OCs was 3.3±2.4 years

The age of mother's and sister's at menopause were

46.5±5.7 and 46.3±5.5 years respectively. The ages of natural menopausal of the mother and older sister(s) were positively correlated with the age of natural menopause of the respondents ($p<0.001$ in both cases). Only 188 of 632 women (29.7%) knew their mothers' age at menopause, whereas 138 women (21.8%) knew their sisters' age at menopause.

Amongst "natural menopause" group, 36.1% (n=228) had early menopause. The probable factors influencing early menopause was evaluated by using univariate and multiple logistic regression analysis (Table 3).

Table 3: Risk factors for early natural menopause: Univariate and multivariate logistic regression analysis (Method:Backward-Wald)

Factors influencing early menopause	**Univariate Logistik Regression**	
	Odds ratio	**95%CI**
Years of education completed		
< 5 years	1	
> 5 years	0.985	0.705-1.378
Smoking habit		
Past-current smoker	1	
Never used	0.785	0.470-1.311
Usage of oral contraception during life		
Yes		
No	1	
Body Mass Index	1.085	0.751-1.568
19-24.9		
25-29.9	1	
30 and over	0.653	0.428-0.998
Parity	0.618	0.386-0.990
> 4		
2-3	1	
0-1	1.348	0.679-2.674
Breastfeeding	0.948	0.672-1.337
< 1 year		
> 1 year	1	
Age at menarche	1.196	0.777-1.841
> 14 years		
< 13 years	1	
Lifelong menstrual cycles	1.033	0.747-1.430
Regular		
Irregular	1	
Cessation style of menses	0.915	0.630-1.331
Irregular menses before cessation		
Spontaneous	1	
Socio-economic status	1.746	1.249-2.440
High	1	
Middle	3.450	1.625-7.325
Low	1.851	0.992-3.456
Menopausal age of the mother	**(n=188)***	
> 46	1	
< 45	4.679	2.376-9.212
Menopausal age of sister	**(n=138)***	
> 46	1	
< 45	10.730	4.182-27.534
Factors influencing early menopause	**Multiple Logistik Regression**	
Socio-economic status		
High	1	
Middle	2.962	1.381-6.355
Low	1.716	0.915-3.218
Cessation style of menses		
Irregular menses before cessation	1	
Spontaneous	1.618	1.151-2.274

* *Menopausal age of mother and old sisters were not included into the logistic analysis because they were very few numbers in this category to make any meaningful analysis.*

In univariate analysis BMI, cessation style of menses, socio-economic status, menopausal age of the mother and the sister; in multiple analysis only cessation style of menses and socioeconomic status were found statistically significant. Multivariate analysis suggested that

middle socio-economic women had a 3.5 increased risk of early menopause; low socio-economic women had a 1.8 increased risk of early menopause than high group. In our study, spontaneous cessation was associated with increased risk of early menopause. Women with spontaneous cessation had 1.7 times higher risk than irregular menses before cessation.

Discussion

The age at menopause has been extensively studied in the industrialized countries and the average age at natural menopause is found to be approximately 50 years.[13] But recent studies report slightly higher ages.[14] In this study the median age at menopause was 47 and, mean age was 47.0±4.6 years. It is significantly lower than the menopausal ages reported from Europe, North America and America.[14-16] But similar to other developing countries like United Arab Emirates,[5] Mexico,[17] India,[18] Nigeria,[19] Pakistan[20] and Turkey.[21,22] This confirms variations in the age of natural menopause between populations. Social, cultural, environmental, and genetic factors and geography may affect it. There have been many studies to find the effect of demographic or environmental factors on the age at menopause.[23]

Some studies have found that a higher educational status is associated with a later onset of menopause.[22,24] However, there are some others including our study that has found no correlation.[25,26]

Smoking is one of the risk factors for early menopaus.[11,23] It decelerates the age at menopause by about 1.5-2 years.[23,27] But in this study we couldn't find any association between smoking and early menopause like some other studies.[18,21] We believe that this depends on the low number (12.1%) of past-current smokers.

When the association between the use of OCs and natural menopausal age was evaluated, no association was found like some studies.[18,22] Some studies reported that women who used OCs had a later age at menopause than women who didn't.[24,28,29] Short usage period may be a reason for not finding an association in our study.

A number of epidemiologic studies have investigated the association between body mass index and age at natural menopause with mixed results.[29,30] Onset of menopause was late in women with high body mass index in most of the studies.[31,32] In our study high BMI was associated with a later age at menopause in univariate analysis, but wasn't in multivariate analysis.

In our study, spontaneous cessation was associated with increased risk of early menopause. There is a need for further studies on this subject.

Low socio-economic status generally associates with early menopause.[29,33] In our study we also found that low and middle socio-economic status associates with early menopause. Whether perceived insecurity and emotional stress or some other dimension related to socio-economic status remains to be studied.

Familial factors were found to be strong determinants of the age at natural menopause in previous studies.[29,34] There have been a number of case studies, however, which have demonstrated similar deletion errors in the X-chromosomes of female relatives who have undergone a premature menopause.[35] In our study it was found that women who had early menopausal ages in their mothers and sisters were at increase risk of having early menopause. Further work in this area would be merited as this might increase our understanding of potential genetic factors underlying the advent of the menopause. It is important that this association is explored further as it could affect the advice given to daughters of women who have undergone an early menopause with respect to timing of their own family.

In conclusion, mean age at natural menopause was found 47.0±4.6 years. The relationship between cessation style of menses, socio-economic level, menopause age of the mother and old sister and age at menopause of the women were found significant. Low and middle socio-economic status, spontaneously cessation of menses have influence on early menopause.

Our recommendation is a better examination of middle age women with regard to factors influencing early menopause in menopause units in the clinics and primary health care centers.

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