A study of age at menopause and related factors

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Abstract: Menopause is a critical stage of women's life which has symptoms and might cause some diseases that affect women's health and their life. This study is performed to find the age of menopause and related factors among women of Hamadan city in 2010. This descriptive cross-sectional study has been performed on 245 menopausal women aged 60 years or younger who have stopped menstruating for at least one year. The data were collected by using questionnaires collected from women at their houses covered by 5 medical centers located in north, south, west, east and center of Hamadan. The data were analyzed by SPSS/10 and Chi square test. Average age at menopause was 47±2.43 years, with the minimum and maximum of 26 and 57 respectively. The most populated group (44.5%) was between 46 and 50 years old. There was a significant statistical relationship between age at menopause and factors such as menopausal age of mother and sister, age at menarche, pelvic surgery, and physical activity (P<0.05). On the other hand, no meaningful relationship was observed between age at menopause and factors such as being a descendant of the prophet Mohammed, education level, job, number of births and body mass index. The average age at menopause among women in Hamadan was less than western countries. In addition of genetic factors, pelvic surgery and physical activity is affecting the age of menopause.
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1. Introduction

Menopause is a transition from a reproductive to non-reproductive state (1). It can be defined as amenorrhea along with hypo estrogenic situation and high FSH level (2) in which the amount of FSH increases to 20 units per liter in the blood (3). In average, menopause occurs at the age of 51 and despite of the *increase* in life expectancy of women, the age of menopause has not changed. After menopause, the ovaries stop producing estrogen which can cause symptoms and disease related to the lack of estrogen (2). The menopause symptoms include irregular periods or amenorrhea, irritability, hot flashes, night sweats, mood change, headache, depression, insomnia, decreased libido and weight change (4). It is estimated that more than one million women are reaching menopause every year and many of them experience vasomotor instability (hot flushes and night sweat) and other mental/nervous symptoms which might affect their quality of life (5). Studies show that by the time of menopause or the end of fertile phase, women are in the risk of some debilitating diseases such as osteoporosis, cardiovascular disease and ovarian/uterine malignancies (6). Loss of bone mass which is usually occurs in the first decade of post menopause, due to

lack of hormones release by ovaries specially estrogen, is the most common problem and can lead to osteoporosis (7).

Not every woman experiences the same level of bothersome; many factors are associated with the severity and the onset of problems such as genetics, daily activity, long term stress and mental shocks, diet, weight fluctuation, hysterectomy and ophorectomy, and some other diseases (5). Epidemiologic studies show that about 10% of average women reach menopause by the age of 45. The analysis of genetic genealogy show that genetic factors of early menopause (40-45) is similar to premature ovarian failure which is based on maternal or paternal hereditary (3). The daughter of women who experienced an early menopause will have early menopause as well. Women with poor diet like vegetarians usually reach menopause earlier (3). Being exposed to toxic elements for ovaries, cigarette, chemotherapy, ovarian surgery or hysterectomy are some factors that might cause early menopause (2). On the other hand, regular and moderate consumption of alcohol can delay menopause. This is in line with the fact that women who drink alcohol have higher level of estrogen in their blood and urine and also they have higher bone

mass density (3). Job and social location affects the way that women perceive menopause and research indicates that working women rate it less negatively (8). Women with higher education level can have better job and socio-economic status. Therefore higher educated women can cope better with this transition and by better understanding they can try to alleviate the negative effects of menopause (7).

The age at menopause in different societies depends on numerous factors such as development level, socio- economic status, race, and religion. The most typical age range for menopause in developing countries is between the ages of 41 and 47, and in developed countries is between the ages of 49 and 52 (9). Finding the factors related to the starting age of menopause, weather earlier or later than the average, can help women to better understand this transition and prepare themselves to cope with the effect of menopause on their life. Hence, many researchers try to find causes contributing to the starting age of menopause.

2. Material and Methods

This research is a descriptive cross-sectional study. Target population was selected based on purposive sampling; from menopausal women under age of 60 living in Hamadan who stopped menstruating for at least one year. We randomly chose five medical centers located in the north, south, east, west, and center of the city and we went door-to-door to the houses covered by each medical center to find cases, around 50 from each district. The total number of samples considering p=0.2 and d=5% was 245. We used questionnaire containing personal and social questions, and content validity method to weight its scientific credit. For this purpose we revised the questionnaire after considering the opinion of faculty members in the Nursing & Midwifery Faculty. To determine the clarity and acceptability of the questions and their reliability, we performed a pilot study on 10 women twice with a 10 day gap in between. The reliability factor of the questions was determined by the Pearson correlation measure, in which in all cases the reliability factor was 95%.

We used standard tools such as weight and height scales; a technician of medical instruments checked the precision of devices and they were compared with other scales. The measurement was taken scientifically by the researcher; for example the weight was taken in a specific time of the day with minimum cloths and no shoes, and the height of was measured in a complete standing position where head, shoulders, heap, knees and were in the same line. For calculating Body Mass Index we used the formula (weigh in kilo gram divided by square of

height in meter). Chi square test and SPSS/10 were used to analysis of the date and to prepare the absolute and relative frequency tables.

3. Results

Analysis of the data show that the average age of menopause for women of Hamadan is 47+2.43 with the maximum of 57 and minimum of 26. The largest percentage (44.5%) of menopauses occurs between the ages of 46 and 50 (table 1). In terms of personal characteristics of women, 91.4% were housewife, 37.6% were illiterate, 74.7% were married, weight of 45.8% of them was more than 70 kg, and height of most of them (44.9%) was less than 155 cm. We found no significant relationship between age of menopause and women's job ($\chi^2_2 =$ 1.412), education level ($\chi^2 =3.619$), marital status ($\chi^2_2 =$ 19.189), and BMI ($\chi^2 = 2.591$) (P>0.05).

Table 1: frequency of cases base on age of menopause

Age of menopause	Number	Percentage
= <40	38	%15.51
41-45	44	%17.96
46-50	109	%44.49
> 50	54	%22.04
Total	245	%100

Age at menarche in 60% of women was between 12 and 14 and only 2% of women experienced their first menstrual cycle after their 18th birthday. In terms of age at menopause of the mothers of women under study, for most of the mothers (44.49%) the menopause happened between the ages of 46 and 50. And for the sisters, most of menopauses (11.8%) occurred between same ranges.

We found meaningful relationship between the age of menopause and age of menarche ($\chi^2 =$ 19.236), sister's age of menopause ($\chi^2 =19.596$) and mother's age of menopause ($\chi^2 =36.272$) (p<0.05) (table 2). Only 4.9% of women were of descendant of the prophet Mohammed. The majority of women (80%) had regular menstrual cycles and the duration of bleeding in 76.3% of them was between 4 to 8 days. The number of child births for most of the women (53.1%) was more than 5, in which only 1.6% of deliveries were by C-section. The statistical tests show that there was no meaningful relationship between the age of menopause and being descendant of the prophet Mohammed ($\chi^2 = 2.616$), the number of child births ($\chi^2 =15.706$), method of delivery ($\chi^2 = 2.303$) and the situation of menstrual cycles ($\chi^2 = 4.742$).

Table 2: frequency of age at menopause of the cases based on mother's age of menopause

Mother's age	Age at menopause				
	<=40	41-45	46-50	>50	All cases
<=40	2 (25%)	3 (37.5%)	3 (37.5%)	0 (0%)	8 (100%)
41-45	9 (32.1%)	3 (10.7%)	15 (53.6%)	1 (3.6%)	28 (100%)
46-50	6 (9.2%)	22 (33.9%)	36 (55.4%)	1 (1.5%)	65 (100%)
>50	5 (14.3%)	4 (14.3%)	25 (71.4%)	0 (0%)	35 (100%)
Uncertain	16 (14.7%)	11 (10.1%)	30 (27.5%)	52 (47.7%)	109 (100%)
Total	38 (15.5%)	44 (18%)	109 (44.5%)	54 (22 %)	245 (100%)
Fisher exact test =36.272 ; p < 0.05					

Table 3: frequency of age at menopause of the cases based on physical activity

Doing Exercise	Age at menopause				
	< = 40	41-45	46-50	> 50	All cases
Yes	4 (4.6%)	5 (5.7%)	58 (66.7%)	20 (23%)	87 (100%)
No	34 (21.5%)	39 (24.7%)	51 (32.3%)	34 (21.5%)	158 (100%)
Total	38 (15.5%)	44 (18%)	109 (44.5%)	54 (22%)	245 (100%)
Chi square = 11.885; P < 0.05					

Regarding the contraceptive methods we found that I.U.D and tubectomy were the least common methods (1.6%) and the natural contraceptive was the most popular method (33.1%). Only 6.9% of women had hormone therapy and 2.5% of them were under hormone therapy for 1 year. 46.5% of women had curettage procedure.

The most common surgical procedure was Tubal ligation (12.3%). Only 2.4% of women had radiotherapy in which most of them were for non-abdomen parts (2%). 35.5% of women were doing exercise (table 3) and 15.5% of them had regular daily exercise program. Most of the women (25.3%) were exposed to the sunlight for about 30 minutes per day.

We found relationship between the age of menopause and doing exercise (χ^2 = 11.885), number of exercise days (χ^2 =19.363), and surgical procedures (χ^2 =11.236) (P<0.05) showing an increase in the age of menopause in women doing exercise and a decrease in the age of menopause in women who had gynecology surgical procedures. But there was no meaningful relationship between factors such as sun exposure (χ^2= 1.412), abdomen

radiotherapy (χ^2 =2.394), contraceptive method (χ^2 = 18.469), and hormone therapy (χ^2 = 3.848) (P>0.05).

4. Discussions

Menopause is one of the most critical stages of women's life which occurs in midlife and because of its symptoms and effects it might significantly create health problems for women. Analysis of the collected data shows that the average age of menopause for women in Hamadan is 47 ±2.43. Research has shown the average age at menopause for other places in Iran such as Tehran is 47.71, Mazandaran is 47.93, Arak is 48.2, Sanandaj is 46.01, Ahvaz is 48, and Birjand is 47.19 (10, 11, 12, 13, 14, 15). Other research reports the average age of menopause in other countries such as Bulgaria is 49.3, Mexico 46.7, Saudi Arabia 48.94, Ankara in Turkey 47, Lahore in Pakistan 49, north of India 46.7, Singapore 49, Taiwan 53.8, Australia 51, USA 51.4, Japan 49.3, and Nigeria is 48.4 (16, 17, 18, 19, 20, 5, 21, 22, 23, 24, 25, 26).

The starting age of menopause in different societies depends on many factors such as level of development, economic and social situation, race and religion. For example, in developing countries the average range is between of 41 and 47, however in developed countries is from 49 to 52 (3). Regarding the personal characteristics, we found that there was significant statistical relationship between the age of menopause for the cases under study and their mother's age of menopause, their sister's age of menopause, age of menarche, and the duration of bleeding in their menstrual cycle. The research on Italian women show the average age of menopause is 50.9;there was relationship between early menopause and early menarche; and there was similarity between age of menopause for mothers and daughters (27).

This result is in line with the findings of the researches performed in Mazandaran, Sanandaj, and Ahvaz; meaning that the late menopause was attributed to having mother or sister with higher age of menopause (14. 13, 11). Studies in Ankara in Turkey and Korea found meaningful relationship between age of menarche and age of menopause showing that women who had early menarche experienced their menopause earlier (28, 29). Also a Swedish study found that early menopause is associated with early menarche (3).

In this study we didn't find meaningful relationship between age of menopause and education level, marital status, body mass index, sun exposure, being descendant of Prophet Mohammed, the number of deliveries, contraceptive methods, and the space between child births, breastfeeding, hormone consumption, and smoking. However a study in Yazd, Iran showed that the menopause is

delayed by the increases in the number of deliveries and the increase in the body mass index which was mentioned that menopause starts earlier in thinner women due to the role of body fat in production of estrogen (30). Based on a study on women in Zahedan, descendant of Prophet Mohammed experienced their menopause later than other women (31). Similarly, the average age at menopause in Esfahan for descendant of Prophet Mohammed was 53.9 which were 2.9 years more than the average for other women (32). A study performed on Malaysian women found no significant relationship between the start of menopause and the age of menarche, number of pregnancies, number of deliveries and number of miscarriages; however they show a relationship between the age of menopause and number of live births (33). On average, menopause for smoking Italian women starts slightly earlier than nonsmokers (27). The study on Caucasian women suggests breastfeeding as a preventive method for early menopause, reporting no relationship between the age of menopause and oral contraceptives and smoking; they show that women with no pregnancies are in higher risk of early menopause (34).

In our study we found relationship between the start of menopause and physical activity and pelvic surgery. A study in Kerman show that menopause starts earlier in women who had reproductive surgeries (35) other studies indicate the same result (12, 14). In terms of physical activities, it seems that regular and not heavy exercise boost the operation of endocrine glands such as pituitary gland which stimulate the ovaries to produce more hormones.We found no meaningful relationship between start of menopause and social factors such as job which is similar to the study performed in north of India (5); however Jonson et al. showed that working women have earlier menopause compare to housewives (33).

The average age of menopause in women of Hamadan is lower than western countries which can be attributed to reproductive surgeries and physical activity other than genetic factor.

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