https://doi.org/10.15218/zjms.2025.055

Cigarette smoking and age of menopause

Received: 16/10/2024 Accepted: 24/11/2024

Ishraq Mahmood Shakir Imarah [1*]

Abstract

Background and objective: To identify the effect of cigarette smoking on women's age of menopause. Earlier time at menopause increased women morbidity and mortality rates. Unhealthy lifestyle had a negative impact on women's age at menopause.

Methods: Present study was a retrospective cross-sectional study implemented at outpatients' clinics of Maternity Teaching hospital in Erbil city, Kurdistan region-Iraq in period of six months from 1st of January to 30th of June 2024on sample of 280 women experienced menopause. The menopause of studied women was confirmed by absence of menstrual cycle for at least one year with experiencing menopause symptoms.

Results: Mean age at menopause was (46.8 years); premature menopause was recorded in 10% of women and early menopause was present in 21.4% of them. A highly significant association was observed between current smoking status of women and earlier menopause (*P* <0.001). Longer smoking duration of women with positive smoking history was related significantly to earlier menopause (*P* <0.001).Single marital status and nulliparity may play role in developing early menopausal age.

Conclusion: The prevalence of premature menopause in women experienced menopause is high. The smoking and duration of smoking are risk factors for earlier age at menopause.

Keywords: Menopause; Lifestyle; Smoking; Morbidity; Mortality.

Introduction

Menopause is known naturally as the lack of menstruation for at least twelve sequential months not related to any intervene like surgery or massive therapy. It is common in women's age of 49 to 52 years and median age of 51.4 years in developed world.[1] and median age of less than 50 years in developing world.[2] Early menopause is defined in women with age group of 40-45 years that present in about 5% of women,[3] while the premature menopause (premature ovarian failure) that occurs in women before age of 40 years represented about 1% of women.[4]

Different com-morbidities like heart diseases, bone diseases and diabetes mellitus are reported for those women with early or premature menopause in addition to higher death rates.[5-7] Moreover, early or premature menopause had a negative impact on women mental status and lead to different anxiety and depressive disorders,[8] in addition to their adverse effects on sexual and reproduction ability which in turn, affect the women's quality of life.[9]

Sub-fertility of women plays a major role in development of early menopause.[10] The genetic role in menopause age of women is not clarified completely and recent literatures revealed the effect of modifiable risk factors in aging of reproductive life.[11,12] Different lifestyle risk factors have a profound impact on menopausal age among women.[13]

Cigarette smoking is a modifiable abnormal health behavior found to be as an accelerator of natural menopause timing. The negative effect of cigarette smoking on

[1] Department of Obstetrics and Gynecology, College of Medicine, Hawler Medical University, Kurdistan Region, Erbil, Iraq.
Correspondence: ishraq.mahmood@hmu.edu.krd

https://doi.org/10.15218/zjms.2025.055

menopause onset was first reported among women in United States of America at the half of last century.[14] Many authors reported this negative correlation between cigarette smoking and age of women's menopause and showed a decline in menopause onset among smoker women as compared to non-smokers.[15,16] Some authors also revealed an effect of smoking duration, packs/year and age since beginning smoking on women's menopause onset.[15,17] Smoking of cigarettes might affect ovarian aging and follicle reserve through disturbing the gonadotropins and sex hormones in addition to toxic impact on ovarian germ cells.[18] The current smoking status is highly accompanied by early menopause.[19] Many authors proved the high risk of early menopause among women with positive smoking history.[20,21] Prevalence of cigarette smoking is increased in Kurdistan region and Iraq especially among adolescents and young adults.[22] It was shown that 15.3% (33.2% males vs. 10.9% females) of adolescents and young adults in Kurdistan region were smokers.[23] Although higher Iraqi male gender predominance in smoking behavior, smoking prevalence was increased among older age and self-employed Iraqi women.[24] This evolving increase in smoking prevalence among women urged us to implement this study that aimed to identify the effect of cigarette smoking on women's age of menopause.

Methods

The design of this study was a retrospective cross-section methodology carried out at outpatients' clinics of Maternity Teaching hospital in Erbil city, Kurdistan region-Iraq in period of six months from 1st of January to 30th of June 2024. Within the period of the study, women confirmed to be menopause were included in the study. Adult women (age 40 years and more) with natural menopause were the inclusion criteria. The early menopause was defined in women with age group of ≤45 [3] by asking women retrospectively. Exclusion criteria were premenopausal women, interventional menopause (surgical and medical causes), mental problems, psychological disease, cancer and women refusing enrollment in the study. Ethical approval was granted by the Research Protocol Ethics Committee of Kurdistan Higher Council of Medical Specialties No. 9, 27 May 2024, in addition to hospital authority and oral informed consent of women. A sample of 280 women experienced menopause was selected after eligibility to inclusion and exclusion criteria.

Data of selected women were gathered by researcher through direct interview between researcher and women that filled in a prepared questionnaire involving women's general characteristics (age, age at menopause, body mass index [underweight <18.5 Kg/m^2, normal 18.5-24.9 Kg/m^2, overweight 25-29.9Kg/m^2, obese ≥30Kg/m^2],[25] educational level, occupation [housewife, public servant or governmental employee, self-employed or non-governmental employee and retired]. marital status [married, single and widow/ divorced], age at menarche and parity history) and smoking characteristics of studied women (smoking status, smoking duration and smoking packs per year). Natural menopausal confirmation was done with absence of menstrual cycle for at least one year with experiencing menopause symptoms (somatic, psychological and urogenital).[3] Current smoking was defined as at least one cigarette per day for at least six months, while ex-smoking was defined as stopping smoking for more than six months. The duration and quantity of smoking combined both current and ex-smoking variables. The women's data were entered and analyzed statistically by statistical package of social sciences program-26 with suitable tests like chi square and fishers' exact tests for statistical relationships, while independent sample t-test was used for continuous variables. Significance level was ≤0.05.

https://doi.org/10.15218/zjms.2025.055

Results

In this study, 280 women were enrolled with mean age (50.1 years); 44.3% of them were in age of 60-69 years. Mean age at menopause was (46.8 years); premature menopause was recorded in 10% of women and early menopause was present in 21.4% of them. Mean BMI of studied women was (28 Kg/m^2) with predominant secondary educational level (32.9%), public servant occupation (37.1%) and married status (72.9%). Mean age at menarche was (13 years) and 60.7% of women were grand multipara. (Table 1)

Table 1 General characteristics of enrolled women

Variable	No. (%)
Age mean±SD (50.1±10.5 years)	
<50 years	68 (24.3)
50-59 years	88 (31.4)
60-69 years	124 (44.3)
Age at menopause mean±SD (46.8±5.2 years)	
<40 years	28 (10.0)
40-45 years	60 (21.4)
46-55 years	192 (68.6)
Body mass index mean±SD (28±4.4Kg/m^2)	
Normal	101 (36.0)
Overweight	179 (64.0)
Educational level	
Illiterate	40 (14.3)
Primary level	84 (30.0)
Secondary level	92 (32.9)
College/institute	64 (22.8)
Occupation	
Housewife	76 (27.1)
Public servant	104 (37.1)
Self-employed	88 (31.5)
Retired	12 (4.3)
Marital status	
Married	204 (72.9)
Single	20 (7.1)
Divorced/widow	56 (20.0)
Age at menarche mean±SD (13±3.3 years)	
<12 years	80 (28.6)
12-14 years	154 (55.0)
>14 years	46 (14.6)
Parity	
Nulliparous	32 (11.4)
Multiparity	78 (27.9)
Grand-multiparity	190 (60.7)
Total	280 (100.0)

https://doi.org/10.15218/zjms.2025.055

The smoking status showed non-smoking in 71.4% of women, current smoking in 23.6% of women and ex-smoking in 5% of them. Smoking mean duration in women with positive smoking history was (9 years); 37.5% of them had smoking duration of less than 5 years. Ten packs per year and more was reported for 30% of women with positive smoking history. (Table 2)

Table 2 Smoking characteristics of enrolled women

Variable	No.
Smoking status	
No	200 (71.4)
Current smoking	66 (23.6)
Ex-smoking	14 (5.0)
Total	**280 (100.0)**
Smoking duration mean±SD (9±4.8 years)	
<5 years	30 (37.5)
5-9 years	26 (32.5)
≥10 years	24 (30.0)
Smoking packs/year	
<10 packs	56 (70.0)
≥10 packs	24 (30.0)
Total	**80 (100.0)**

https://doi.org/10.15218/zjms.2025.055

No statistically significant differences were observed between women with premature or early menopause and women with menopause age of more than 45 years in regard to women's age (*P* = 0.12), body mass index (*P* = 0.3), educational level (*P* = 0.6), occupation (*P* = 0.6) and age at menarche (*P* = 0.69). There was a highly significant association between single marital status of women and earlier menopause (*P* <0.001). Nulliparity of studied women was significantly related to earlier menopause (*P* <0.001). (Table 3)

Table 3 Distribution of women's general characteristics according to age at menopause

Variable	Menopause age				*P-value*
	≤45 years		>45 years		
	No.	(%)	No.	(%)	
Age					0.12[NS]
<50 years	18	(20.6)	50	(26.1)	
50-59 years	35	(39.7)	53	(27.6)	
60-69 years	35	(39.7)	89	(46.3)	
BMI					0.3[NS]
Normal	36	(40.9)	65	(33.8)	
Overweight	52	(59.1)	127	(66.2)	
Educational level					0.6 [NS]
Illiterate	10	(11.4)	30	(15.6)	
Primary level	28	(31.8)	56	(29.2)	
Secondary level	32	(36.4)	60	(31.2)	
College/institute	18	(20.4)	46	(24.0)	
Occupation					0.6 [NS]
Housewife	24	(27.2)	52	(27.1)	
Public servant	36	(40.9)	68	(35.4)	
Self-employed	26	(29.6)	62	(32.3)	
Retired	2	(2.3)	10	(5.2)	
Marital status					<0.001[S]
Married	24	(27.2)	180	(93.7)	
Single	20	(22.8)	0	(-)	
Divorced/widow	44	(50.0)	12	(6.3)	
Age at menarche					0.69 [NS]
<12 years	26	(29.6)	54	(28.1)	
12-14 years	50	(56.8)	104	(54.2)	
>14 years	12	(13.6)	34	(17.7)	
Parity					<0.001[S]
Nulliparous	28	(31.8)	4	(2.1)	
Multiparity	36	(41.0)	42	(21.8)	
Grand-multiparity	24	(27.2)	146	(76.1)	

S=Significant, NS=Not significant.

https://doi.org/10.15218/zjms.2025.055

A highly significant association was observed between current smoking status of women and earlier menopause (*P* <0.001). Longer smoking duration of women with positive smoking history was related significantly to earlier menopause (*P* <0.001).There was no statistically significant effect of smoking packs/year on age at menpause (*P* = 0.1). (Table 4)

Table 4 Distribution of smoking characteristics according to age at menopause

Variable	Menopause age				*P-value*
	≤45 years		>45 years		
	No.	(%)	No.	(%)	
Smoking status					<0.001[S]
No	32	(36.4)	168	(87.5)	
Current smoking	44	(50.0)	22	(11.4)	
Ex-smoking	12	(31.6)	2	(1.1)	
Smoking duration					<0.001[S]
<5 years	12	(21.4)	18	(75.0)	
5-9 years	20	(35.7)	6	(25.0)	
≥10 years	24	(42.9)	0	-	
Smoking packs/year					0.1 [NS]
<10 packs	36	(64.3)	20	(83.3)	
≥10 packs	20	(35.7)	4	(16.7)	

S=Significant, NS=Not significant.

https://doi.org/10.15218/zjms.2025.055

Discussion

Onset of natural menopause is representative for end of reproductive phase and biological aging of women with beginning of health status deterioration. Early menopause is associated with increased morbidity and mortality rates. In contrast, some authors revealed that earlier menopause is lowering breast and ovarian cancers.[26]

This study showed that mean age at menopause for studied women was (46.8 years) which was earlier than mean menopausal age of (49.01 years) reported by previous Iraqi cross-sectional study.[27] In this study, the premature menopause was recorded in 10% of women and early menopause was present in 21.4% of them. These findings are close to results of previous study carried out in Baghdad city/ Iraq that found premature menopause in 4.4% of women experienced menopause and early menopause in 23.6% of them.[28] In present study, the prevalence of premature menopause among women was high. This high premature menopause prevalence might be attributed to westernization of women lifestyle in Erbil city, obesity, smoking, hormonal disturbances and contraceptive methods.[29] A cross-sectional study conducted in Iran reported premature menopause in 3% of women and early menopause in 20% of them.[30]

Present study found a highly significant association between current smoking status of women and earlier menopause (P <0.001). This finding is consistent with results of different literatures which revealed the statistically significant effect of current smoking of women on reducing age at natural menopause.[14-16,31]

Recent cross-sectional study reported that although low smoking prevalence among women in Erbil city-Kurdistan region/Iraq, the smoking had a negative correlation with age at menopause[29] Current study also found that longer smoking duration of women was significantly related to earlier menopause (P <0.001). Similarly, a pooled analysis study from 17 articles in seven developed countries revealed that earlier age at menopause was affected by smoking intensity and duration.[32] However, present study showed no effect of smoking quantity on age at menopause. This finding may due to low smoking quantity among studied women in general.[33]

Current study found a highly significant association between single marital status of women and earlier menopause (P <0.001). Consistently, recent study implemented in United Kingdom reported that infrequent sexual activity leads to earlier age at natural menopause.[34] Present study also showed that nulliparity of studied women was significantly related to earlier menopause (P <0.001).This finding coincides with results of previous pooled analysis study conducted in different countries which reported that early age at menarche and nulliparity had a negative impact at menopausal age.[35]

Conclusion

This study concluded that smoking and duration of smoking are risk factors for earlier age at menopause. The prevalence of premature menopause in women experienced menopause is high. Single marital status and nulliparity may play role in developing early menopausal age. This study recommended encouraging women to adopt healthy lifestyle and avoid smoking.

Competing interests

The author declares that she has no competing interests.

References

1. Amiri M, Rahmati M, Farahmand M, Azizi F, Tehrani FR. Age at natural menopause in women with a history of chronic diseases-A population-based cohort study. Maturitas. 2022; 158:16-24. doi: 10.1016/j.maturitas.2021.11.001.
2. Leone T, Brown L, Gemmill A. Secular trends in premature and early menopause in low-income and middle-income countries. BMJ Glob Health. 2023; 8(6):e012312. doi: 10.1136/bmjgh-2023-012312.

3. Shifren JL, Gass ML, NAMS Recommendations for Clinical Care of Midlife Women Working Group. The North American Menopause Society recommendations for clinical care of midlife women. Menopause (New York, NY). 2014; 21(10):1038–62. doi: 10.1097/GME.0000000000000319.
4. Hernández-Angeles C, Castelo-Branco C. Early menopause: A hazard to a woman's health. Indian J Med Res. 2016; 143(4):420-7. doi: 10.4103/0971-5916.184283.
5. Muka T, Oliver-Williams C, Kunutsor S, Laven JS, Fauser BC, Chowdhury R, et al. Association of Age at Onset of Menopause and Time Since Onset of Menopause With Cardiovascular Outcomes, Intermediate Vascular Traits, and All-Cause Mortality: A Systematic Review and Meta-analysis. JAMA cardiology. 2016; 1(7):767–76. doi: 10.1001/jamacardio.2016.2415.
6. Brand JS, Onland-Moret NC, Eijkemans MJ, Tjonneland A, Roswall N, Overvad K, et al. Diabetes and onset of natural menopause: results from the European Prospective Investigation into Cancer and Nutrition. Hum Reprod. 2015; 30(6):1491–98. doi: 10.1093/humrep/dev054.
7. LeBlanc ES, Kapphahn K, Hedlin H, Desai M, Parikh NI, Liu S, et al. Reproductive history and risk of type 2 diabetes mellitus in postmenopausal women: findings from the Women's Health Initiative. Menopause (New York, NY) 2017; 24(1):64–72. doi: 10.1097/GME.0000000000000714.
8. van Zwol-Janssens C, Pastoor H, Laven JSE, Louwers YV, Jiskoot G. Sexual function in women with premature ovarian insufficiency (POI): Systematic review and meta-analysis. Maturitas. 2024; 184:107994. doi: 10.1016/j.maturitas.2024.107994.
9. Hutchings HA, Taylor N, Remesh A, Rafferty J. A study evaluating quality of life and factors affecting it before, during and after menopause. Eur J Obstet Gynecol Reprod Biol. 2023; 289:100-107. doi: 10.1016/j.ejogrb.2023.08.373.
10. Faubion SS, Kuhle CL, Shuster LT, Rocca WA. Long-term health consequences of premature or early menopause and considerations for management. Climacteric. 2015; 18(4):483-91. doi: 10.3109/13697137.2015.1020484.
11. Whitcomb BW, Purdue-Smithe A, Hankinson SE, Manson JE, Rosner BA, Bertone-Johnson ER. Menstrual Cycle Characteristics in Adolescence and Early Adulthood Are Associated with Risk of Early Natural Menopause. J Clin Endocrinol Metab. 2018; 103(10):3909-18. doi: 10.1210/jc.2018-01110.
12. Choe SA, Sung J. Trends of Premature and Early Menopause: a Comparative Study of the US National Health and Nutrition Examination Survey and the Korea National Health and Nutrition Examination Survey. J Korean Med Sci. 2020; 35 (14):e97. doi: 10.3346/jkms.2020.35.e97.
13. Rostami-Moez M, Masoumi SZ, Otogara M, Farahani F, Alimohammadi S, Oshvandi K. Examining the Health-Related Needs of Females during Menopause: A Systematic Review Study. J Menopausal Med. 2023; 29(1):1-20. doi: 10.6118/jmm.22033
14. Allen AM, Oncken C, Hatsukami D. Women and Smoking: The Effect of Gender on the Epidemiology, Health Effects, and Cessation of Smoking. Curr Addict Rep. 2014; 1(1):53-60. doi: 10.1007/s40429-013-0003-6.
15. Yang HJ, Suh PS, Kim SJ, Lee SY. Effects of Smoking on Menopausal Age: Results From the Korea National Health and Nutrition Examination Survey, 2007 to 2012. J Prev Med Public Health. 2015; 48(4):216-24. doi: 10.3961/jpmph.15.021.
16. Jiang Z, He R, Wu H, Yu J, Zhu K, Luo Q, et al. The causal association between smoking initiation, alcohol and coffee consumption, and women's reproductive health: A two-sample Mendelian randomization analysis. Front Genet. 2023; 14:1098616. doi: 10.3389/fgene.2023.1098616.
17. Oboni JB, Marques-Vidal P, Bastardot F, Vollenweider P, Waeber G. Impact of smoking on fertility and age of menopause: a population-based assessment. BMJ Open. 2016; 6(11):e012015. doi: 10.1136/bmjopen-2016-012015.
18. Kundu S, Acharya SS. Exploring the triggers of premature and early menopause in India: a comprehensive analysis based on National Family Health Survey, 2019-2021. Sci Rep 2024; 14(1):3040. doi: 10.1038/s41598-024-53536-9.
19. Ceylan B, Özerdoğan N. Factors affecting age of onset of menopause and determination of quality of life in menopause. Turk J Obstet Gynecol. 2015; 12(1):43-9. doi: 10.4274/tjod.79836.
20. Ebong IA, Wilson MD, Appiah D, Michos ED, Racette SB, Villablanca A, et al. Relationship Between Age at Menopause, Obesity, and Incident Heart Failure: The Atherosclerosis Risk in Communities Study. J Am Heart Assoc. 2022; 11(8):e024461. doi: 10.1161/JAHA.121.024461.
21. Peycheva D, Sullivan A, Hardy R, Bryson A, Conti G, Ploubidis G. Risk factors for natural menopause before the age of 45: evidence from two British population-based birth cohort studies. BMC Womens Health. 2022; 22(1):438. doi: 10.1186/s12905-022-02021-4.
22. Hussain HY, Abdul Satar BA. Prevalence and determinants of tobacco use among Iraqi adolescents: Iraq GYTS 2012. Tob Induc Dis. 2014; 11(1):14. doi: 10.1186/1617-9625-11-14
23. Al-Dahshan A, El Zoghbi M, Chehab MAH, Naja S, Selim NAA. Tobacco use among adolescents in Qatar: Findings from Global Youth Tobacco Surveys 2004-2013. Tob Prev Cessat. 2019; 5:10. doi: 10.18332/tpc/105110.

24. Al-Badri HJA, Khaleefah Ali MA, Ali AA, Sahib AJ. Socio-economic determinants of smoking among Iraqi adults: Data from Non Communicable Risk Factor STEPS survey 2015. PLoS ONE. 2017; 12(9):e0184989. doi: 10.1371/journal.pone.0184989
25. Lim JU, Lee JH, Kim JS, Hwang YI, Kim TH, Lim SY, et al. Comparison of World Health Organization and Asia-Pacific body mass index classifications in COPD patients. Int J Chron Obstruct Pulmon Dis. 2017; 12:2465-75. doi: 10.2147/COPD.S141295.
26. Schoenaker DA, Jackson CA, Rowlands JV, Mishra GD. Socioeconomic position, lifestyle factors and age at natural menopause: a systematic review and meta-analyses of studies across six continents. Int J Epidemiol. 2014; 43(5):1542-62. doi: 10.1093/ije/dyu094.
27. Ahmed DT, Hussein EA. The menopausal age and associated factors in a sample of Iraqi postmenopausal women. International Journal for Sciences and Technology. 2015; 10(2):41. doi:10.12816/0017836.
28. Mustafa GN, Sabir JM. Perception and experience regarding menopause among menopaused women attending teaching hospitals in Erbil City. Glob J Health Sci. 2012; 4(3):170-78. doi: 10.5539/gjhs.v4n3p170.
29. Ibrahim WA, Mohammed MA, Abdullah WH. Lifestyle Practices among Menopausal Women in Erbil City, Iraq. IJDDT. 2022; 12(2):528-33.
30. Meher T, Sahoo H. Premature menopause among women in India: Evidence from National Family Health Survey-IV. J Obstet Gynaecol Res. 2021; 47(12):4426-39. doi: 10.1111/jog.15041.
31. Jambarsang S, Khodayarian M, Sefidkar R, Yoshany N. Prevalence of premature ovarian insufficiency (POI) and its relationship with female reproductive factors in Iranian women: a cross-sectional study from the Persian (Shahedieh) cohort data. BMC Women's Health. 2023; 23(1):467. doi: 10.1186/s12905-023-02620-9
32. Whitcomb BW, Purdue-Smithe AC, Szegda KL, Boutot ME, Hankinson SE, Manson JE, et al. Cigarette Smoking and Risk of Early Natural Menopause. Am J Epidemiol. 2018; 187(4):696-704. doi: 10.1093/aje/kwx292
33. Zhu D, Chung HF, Pandeya N, Dobson AJ, Cade JE, Greenwood DC, et al. Relationships between intensity, duration, cumulative dose, and timing of smoking with age at menopause: A pooled analysis of individual data from 17 observational studies. PLoS Med. 2018; 15(11):e1002704. doi: 10.1371/journal.pmed.1002704.
34. Arnot M, Mace R. Sexual frequency is associated with age of natural menopause: results from the Study of Women's Health across the Nation. R Soc Open Sci. 2020; 7(1):191020. doi: 10.1098/rsos.191020.
35. Mishra GD, Pandeya N, Dobson AJ, Chung HF, Anderson D, Kuh D, et al. Early menarche, nulliparity and the risk for premature and early natural menopause. Hum Reprod. 2017; 32(3):679-86. doi: 10.1093/humrep/dew350.