Original Article

Impaired Quality of Life and Its Determinants among Postmenopausal Women of Slum Communities in Bhubaneswar, India

Amrita Kumari, Ansuman Panigrahi[1], Adrija Roy[2], Jyochnamayi Panda[3]

Department of Community Medicine, PRM Medical College and Hospital, Baripada, Departments of [1]Community Medicine and [3]Obstetrics and Gynaecology, Kalinga Institute of Medical Sciences, KIIT University, [2]Department of Community Medicine and Family Medicine, All India Institute of Medical Sciences, Bhubaneswar, Odisha, India

ABSTRACT

Background: The severity of menopausal symptoms negatively impacts a woman's quality of life (QoL). **Objective:** The aim of the study was to assess the prevalence of menopause-related impaired QoL and determine its associated factors among postmenopausal women living in slum areas of Bhubaneswar, India. **Materials and Methods:** This cross-sectional study was conducted among 198 postmenopausal women aged 45–65 years during the year 2016–2017. The Menopause Rating Scale (MRS) was used to assess the prevalence and severity of menopausal symptoms. **Results:** Joint and muscular discomfort was the most prevalent moderate-to-severe symptom (90.4%), followed by hot flushes (72.8%), irritability (67.2%), and physical and mental exhaustion (64.2%). More than two-third (133, 67.2%) of women had impaired QoL (severe total MRS score ≥17). Multivariate logistic regression analysis revealed that impaired QoL was associated younger age (adjusted odds ratio [AOR]: 4.6, 95% confidence interval [CI]: 2.12–9.98), tobacco consumption (AOR: 2.0, 95% CI: 1.05–3.82), not being satisfied in relation with husband (AOR: 3.33, 95% CI: 1.84–6.06), not having autonomy in health-care decision-making in the family (AOR: 2.30, 95% CI: 1.12–4.73), history of reproductive tract infection (AOR: 4.57, 95% CI: 1.71–12.19), and earlier onset of menopause (AOR: 3.26, 95% CI: 1.18–8.96). **Conclusion:** The point prevalence of menopause-related impaired QOL in postmenopausal women living in slums of Bhubaneswar was high. Incorporating these determinants in the existing strategies can be useful to improve the QoL of these women.

KEYWORDS: *Postmenopausal women, quality of life, reproductive tract infection, slum, tobacco consumption*

INTRODUCTION

Menopause is a normal physiological process which is characterized by the permanent cessation of menses in women due to reduced ovarian hormone secretion.[1,2] Various menopausal symptoms such as vasomotor, psychological, physical, and urogenital symptoms start appearing during this period, which may disturb a woman's quality of life (QoL).[2-4] The severity of menopausal symptoms negatively affects daily life activities and social life, thus significantly impairs QoL.[5-7] According to the WHO, QoL refers to one's perceptions of his/her status in life as per the cultural and value systems in which they live and with regard to their goals, expectations, standards, and concerns.[8] There is a considerable variation in the prevalence of

menopausal symptoms and its severity[9,10] and this variation depends on the geographic, socioeconomic, and cultural environment of the women where they live.[11-13] The age of onset of natural menopause varies worldwide ranging between 44.6 and 52 years.[14] In India, the mean age of onset of natural menopause is 45.02 ± 4.35 years[15] and life expectancy of a woman is around 70 years. Thus, the postmenopause period corresponds to around one-third of a woman's lifespan which makes the QoL during this period a big concern

Access this article online

Quick Response Code:

Website: www.jmidlifehealth.org

DOI: 10.4103/jmh.JMH_111_19

for women.[16,17] Moreover, women face the burden of social discrimination throughout their lives from the womb to the tomb.

Slum-dwellers are deprived of the basic needs for a healthy life and live in an unhygienic environment which puts them at greater risk of developing various health hazards.[18] Women living in such areas experience very poor QoL because of being under shadows of poverty, ignorance, neglect, and sufferings.[19,20] To date, there is limited information about menopause-related QoL in India, particularly in this region. The issue of specific problems of women beyond the reproductive age, especially in slum areas, always gets less attention and thus remains unaddressed. With this backdrop, we designed the present study to assess the prevalence of menopause-related impaired QoL and associated factors among postmenopausal women living in slum areas of Bhubaneswar city in the Eastern region of India.

MATERIALS AND METHODS

Study participants

A community-based cross-sectional study was carried out in 11 selected slum areas of Bhubaneswar, the capital city of Odisha state in the Eastern part of India during the year 2016–2017. Assuming the prevalence of severe menopausal symptoms among postmenopausal women as 50% with an estimated 10% absolute precision at 95% confidence interval (CI) and a design effect of 2, the sample size was calculated as 192. A multistage cluster sampling technique was adopted to select the study areas. The city of Bhubaneswar is divided into five zones: East, West, North, South, and Central, of which East and North zones were randomly selected. A list of all the wards having slums in the selected zones was obtained from Bhubaneswar Municipal Corporation and 50% of these wards in each zone were randomly chosen. Overall, 11 wards were selected and from each ward, one slum was randomly selected. Then, in each slum, 20 households having eligible women were considered for the study purpose. In case of the presence of more than one eligible woman in a household, only one woman was randomly selected for the study. All the postmenopausal women aged 45–65 years with at least 1 year of amenorrhea residing in slum areas for at least 5 years and willing to participate in the study were included in the study. Women receiving any kind of hormone therapy, those who attained surgical menopause, those with chronic illnesses such as diabetes, hypertension, cardiac disease, thyroid disorder, and mental disorder were excluded from the study. After screening of 332 menopausal women, 220 (66.3%) women were found eligible, of which 207 (94.1%) agreed to participate in the study.

Study tool and data collection

With the help of a structured schedule, data on sociodemographic variables including age, education, occupation, marital status, and monthly income of the family; reproductive characteristics such as parity, age at last menstruation, and history of reproductive tract infection during the past year; dietary habit; personal relation with husband; and autonomy in health-care decision-making in the family were collected. After physical examination of each study participant, the Menopause Rating Scale (MRS) was used to assess the health-related QoL.

The MRS is a menopause specific health-related QoL scale that was originally developed in the early 1990s to measure the severity of menopause-related complaints.[21,22] It is a standardized health-related QoL scale with good psychometric characteristics which has been well accepted internationally.[23,24] The scale consists of 11 items to assess the menopausal symptoms and is categorized into three subscales: (a) somatic: hot flushes, heart discomfort, sleep problems, and joint and muscular discomfort (items 1, 2, 3, and 11, respectively); (b) psychological: depressive mood, irritability, anxiety, and physical and mental exhaustion (items 4, 5, 6, and 7, respectively); and (c) urogenital: sexual problems, bladder problems, and dryness of the vagina (items 8, 9, and 10, respectively). Each item can be graded by an individual from 0 (none) to 4 (1 = mild; 2 = moderate; 3 = severe; and 4 = very severe). The total score for each subscale is the sum of each graded item contained in that subscale. Total MRS score is the sum of the three subscale scores and a total score of ≥17 was considered severe.

Ethical considerations

The study was approved by the Institutional Ethics Committee of the authors' institution and performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. Written informed consent was obtained from all the study participants before involvement in the study.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics for Windows, Version 21.0 (IBM Corp., Armonk, N.Y., USA). Data were expressed as mean ± standard deviation, percentage, odds ratio, and confidence interval. Based on total MRS scores, two categories were created: those exhibiting total scores ≥17 indicating the impaired QoL and those with total scores <17 indicating the unimpaired QoL. First, each sociodemographic and reproductive characteristic was tested with univariate logistic regression analysis, and all those found to have $P \leq 0.1$ were included in the

final multivariate logistic regression model. All *P* values were two tailed, and *P* < 0.05 was considered statistically significant. In the multivariate model, independent variables found to have significant associations with the impaired QoL were examined for the presence of any interactions. Model Wald F statistic was checked to assess whether the model adequately fits the data. As a complex sampling design was used in the study, sample weights were taken into consideration during the data analysis for obtaining more valid results.

RESULTS

A total of 207 eligible women participated in the study, of which 198 were considered for statistical analysis, as the rest were excluded due to incomplete data. The mean age of the study respondents was 54.7 ± 5.4 years and the majority (82, 41.4%) of women respondents were more than 55 years of age [Table 1]. Of 198 women surveyed, almost half (95, 48%) of the study participants were illiterate, 166 (83.8%) were housewives, and 147 (74.2%) were married. In 140 (70.7%) households, the monthly income was less than rupees 8000 (120 USD equivalent). Other aspects related to surveyed women include vegetarian (20.7%), consumed tobacco (71.7%), satisfactory relation with husband (57.6%), and having autonomy in health-care decision-making in the family (73.2%). Regarding the reproductive characteristics of the study participants, it was found that two-third of them reported having attained menarche at ≤13 years of age, and the mean age at last menstruation was 45.8 ± 2.7 years. The mean age at marriage was 17.7 ± 3.4 years and the mean age at first childbirth was 19.4 ± 3.1 years.

All the subscales except the urogenital subscale showed acceptable internal consistency reliability with Cronbach's α ≥ 0.70 [Table 2]. It was observed that 133 (67.2%) study participants had a total score of 17 or more, indicating impaired QoL, and the severity is more in the urogenital domain (76.3%). The mean total MRS score was 20.42 ± 7.56 (median: 19.0, range: 0–44); somatic subscale: 8.24 ± 3.13 (median: 8.0, range: 0–16); psychological subscale: 7.2 ± 3.08 (median: 7.0, range: 0–16); and the urogenital subscale: 4.98 ± 2.21 (median: 4.5, range: 0–12). It was also revealed that joint and muscular discomfort was the most prevalent moderate-to-severe symptom (90.4%) followed by hot flushes (72.8%), irritability (67.2%), physical and mental exhaustion (64.2%), heart discomfort (63.6%), anxiety (62.6%), sleep problems (62.1%), bladder problems (60.6%), depressive mood (54.1%), dryness of the vagina (47.7%), and sexual problems (43.0%).

Logistic regression determined that impaired QoL (severe total MRS score ≥17) was associated with younger age (AOR: 4.6, 95% CI: 2.12–9.98), tobacco consumption (AOR: 2.0, 95% CI: 1.05–3.82), not being satisfied in relation with husband (AOR: 3.33, 95% CI: 1.84–6.06), not having autonomy in health-care decision-making in the family (AOR: 2.30, 95% CI: 1.12–4.73), history of reproductive tract infection (AOR: 4.57, 95% CI: 1.71–12.19), and earlier onset of menopause (AOR: 3.26, 95% CI: 1.18–8.96) [Table 3].

DISCUSSION

In our study, among the moderate-to-severe symptoms, joint and muscular discomfort was found to be the most prevalent (90.4%) complaint followed by hot flushes (72.8%), irritability (67.2%), and physical and mental exhaustion (64.2%). This is consistent with other study results.[6,16,25,26] Many other studies have also reported joint and muscle pain as the most common menopausal symptom.[4,26,27]

It was observed in the study that the prevalence of impaired QoL (severe total MRS score ≥17) among postmenopausal slum women was 67.2% which is higher as compared to findings of other studies conducted in various countries which range from 13.7% to 57.7%.[4,28,29] This might be due to methodological differences, different study populations, and sociocultural differences.

In the present study, age was found to be a protective factor for severe symptoms. Younger postmenopausal women (45–50 years) were 4.6 times more likely to have a severe MRS score than older women (>55 years). Studies have demonstrated that the MRS score was inversely associated with age[4,30] supporting our results.

It was also noticed that tobacco consumption did show a significant impact on menopausal symptoms. Women who were consuming tobacco had twice the odds of presenting severe symptoms than those who did not consume tobacco. Perez *et al.* observed that women who smoked were 1.9 times more likely to report severe symptoms than those who did not smoke.[31] Similar results have been reported in previous studies.[25,30,32,33] Women who smoke usually have low estrogen levels as compared to nonsmokers and this may be associated with the severity of the menopausal symptoms.[4,34]

Women who reported that they were not satisfied with the relationship with their husbands were 3.3 times more likely to have poor QoL (AOR: 3.57) than their counterparts. Women having good relations with their husbands may develop psychological stability which may help in reducing the severity of symptoms. Ray

Table 1: Univariate logistic regression analyses showing the association between sociodemographic and reproductive characteristics with impaired quality of life (severe Menopause Rating Scale score) (*n*=198)

Variable	Severity		OR	*P*
	No (%)	Yes (%)		
Age in years				
45-50	8 (14.8)	46 (85.2)	3.49	0.000
51-55	26 (41.9)	36 (58.1)	0.84	0.519
>55	31 (37.8)	51 (62.2)	1	-
Education				
Illiterate	30 (31.6)	65 (68.4)	1.01	0.978
Primary	28 (34.6)	53 (65.4)	0.88	0.756
Secondary and above	07 (31.8)	15 (68.2)	1	-
Occupation				
Housewife	53 (31.9)	113 (68.1)	1.28	0.430
Outside job	12 (37.5)	20 (62.5)	1	-
Marital status				
Divorced/separated	14 (27.5)	37 (72.5)	1.40	0.224
Married	51 (34.7)	96 (65.3)	1	-
Income per month (In rupees)				
≤6000	30 (36.1)	53 (63.9)	0.93	0.794
6000-8000	15 (26.3)	42 (73.7)	1.47	0.223
≥8000	20 (34.5)	38 (65.5)	1	-
Body mass index (mean±SD)	22.66±2.02	22.45±1.91	0.948	0.385
Dietary habit				
Vegetarian	7 (17.1)	34 (82.9)	2.85	0.003
Nonvegetarian	58 (36.9)	99 (63.1)	1	-
Tobacco consumption				
Yes	40 (28.2)	102 (71.8)	2.04	0.005
No	25 (44.6)	31 (55.4)	1	-
Relation with husband				
Not satisfactory	18 (21.4)	66 (78.6)	2.56	0.000
Satisfactory	47 (41.2)	67 (58.8)	1	-
Decision-making autonomy				
No	10 (18.9)	43 (81.1)	2.63	0.002
Yes	55 (37.9)	90 (62.1)	1	-
History of reproductive tract infection				
Present	05 (20.0)	20 (80.0)	2.13	0.066
Absent	60 (34.7)	113 (65.3)	1	-
Parity				
1-2	35 (31.0)	78 (69.0)	1.22	0.410
>2	30 (35.3)	55 (64.7)	1	-
Age at last menstruation in years				
≤45	26 (26.3)	73 (73.7)	3.37	0.001
46-49	27 (35.1)	50 (64.9)	2.22	0.037
≥50	12 (54.5)	10 (45.5)	1	-

OR: Odds ratio, SD: Standard deviation

et al. revealed in their study that deterioration of the relationship with the husband had a detrimental effect on the QoL of postmenopausal women.[3] This indicates how a harmonious relationship with the husband positively influences the QoL of the postmenopausal women. In addition, women having autonomy in health-care decision making in the family had significantly better QoL than those who did not have autonomy. Murtagh

and Hepworth reported that women's autonomy in making decisions regarding their menopausal symptoms can positively impact the quality of their lives.[35]

The present study revealed a significant association between history of reproductive tract infection and severity of menopausal symptoms. The odds of presenting severe symptoms increased about 4.6 times in postmenopausal women who had a positive history

Table 2: Reliability analysis and summary of total and subscale Menopause Rating Scale scorings showing the degree of severity

MRS Scorings	*n* (%)	Cronbach's α	Cronbach's α based on standardized items
Total score (11 items)			
Mild (5-8)	8 (4.0)	0.911	0.913
Moderate (9-16)	57 (28.8)		
Severe (17+)	133 (67.2)		
Somatovegetative domain (4 items)			
No, little (0-2)	7 (3.5)	0.853	0.853
Mild (3-4)	12 (6.1)		
Moderate (5-8)	100 (50.5)		
Severe (9+)	79 (39.9)		
Psychological domain (4 items)			
No, little (0-1)	3 (1.5)	0.832	0.846
Mild (2-3)	18 (9.1)		
Moderate (4-6)	73 (36.9)		
Severe (7+)	104 (52.5)		
Urogenital domain (3 items)			
No, little (0)	2 (1.0)	0.670*	0.659*
Mild (3-4)	2 (1.0)		
Moderate (5-8)	43 (21.7)		
Severe (9+)	151 (76.3)		

*Does not meet acceptable minimum of 0.70. MRS: Menopause Rating Scale

Table 3: Multivariate logistic regression analysis showing the association between socio-demographic and reproductive characteristics with impaired quality of life (severe Menopause Rating Scale score) (*n*=198)

Variable	AOR (95% CI)	*P*
Age in years		
45-50	4.60 (2.12-9.98)	0.000
51-55	0.95 (0.53-1.73)	0.883
>55	1	-
Dietary habit		
Vegetarian	1.81 (0.72-4.53)	0.204
Nonvegetarian	1	-
Tobacco consumption		
Yes	2.0 (1.05-3.82)	0.035
No	1	-
Relation with husband		
Not satisfactory	3.33 (1.84-6.06)	0.000
Satisfactory	1	-
Decision-making autonomy		
No	2.30 (1.12-4.73)	0.024
Yes	1	-
History of reproductive tract infection		
Present	4.57 (1.71-12.19)	0.003
Absent	1	-
Age at last menstruation in years		
≤45	1.90 (0.72-5.0)	0.190
46-49	3.26 (1.18-8.96)	0.022
≥50	1	-

P<0.05 (statistically significant); Model Wald *F*=5.342, *P*<0.001 indicates that the model adequately fits the data. Nagelkerke's R^2=0.272, The classification table reports that overall expected model performance is 73.2%, that is, 73.2% of the cases can be expected to be classified correctly by the model. AOR: Adjusted odds ratio, SD: Standard deviation, CI: Confidence interval

of reproductive tract infection last year as compared to those reporting no such infection. Studies have shown that immune factors are compromised in the reproductive tract of postmenopausal women which increases the

susceptibility to infections.[36,37] Furthermore, women with earlier onset of menopause had a higher chance of developing severe symptoms than those with late onset. The QoL of women is more adversely affected when entering menopause at earlier ages.[38]

Our study has some limitations. Due to the cross-sectional nature of the study, it is difficult to establish a causal association between various factors and QoL among postmenopausal women. As the information collected is mostly subjective, it might introduce recall bias and bias due to social desirability.

CONCLUSION

In conclusion, more than two-third of postmenopausal women living in slums of Bhubaneswar had menopause-related impaired QoL. Incorporating determinants like young age, tobacco consumption, dissatisfactory relationship with husband, lack of autonomy in health-care decision-making in the family, history of reproductive tract infection, and earlier onset of menopause in the existing strategies can be useful to improve the QoL of these women in this important phase of their lives. Further studies are required to ascertain the predicting factors of the menopause-related impaired QoL so that appropriate preventive and therapeutic measures can be planned for ensuring good QoL for postmenopausal slum women.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES

1. WHO Scientific Group on Research on the menopause. Research on the Menopause in the 1990s. Vol. 866. World Health Organization, Geneva, Switzerland; 1996.
2. Mohamed H, Lamadah S, Zamil L. Quality of life among menopausal women. Int J Reprod Contraception Obstet Gynecol 2014;3:552-61.
3. Ray S, Dasgupta A. An assessment of QOL and its determining factors of post menopausal women in a rural area of West Bengal, India: A multivariate analysis. Int J Med Public Heal 2012;2:12-9.
4. Capistrano EJM, Dombek K, Da Costa ACC, Marinheiro LPF. Factors associated with the severity of menopausal symptoms in postmenopausal Brazilian women. Reprod Clim 2015;30:70-6. doi:10.1016/j.recli.2015.09.002.
5. Satoh T, Ohashi K. Quality-of-life assessment in community-dwelling, middle-aged, healthy women in Japan. Climacteric 2005;8:146-53.
6. Waidyasekera H, Wijewardena K, Lindmark G, Naessen T. Menopausal symptoms and quality of life during the menopausal transition in Sri Lankan women. Menopause 2009;16:164-70.
7. Williams RE, Levine KB, Kalilani L, Lewis J, Clark RV. Menopause-specific questionnaire assessment in US population-based study shows negative impact on health-related quality of life. Maturitas 2009;62:153-9.
8. The WHOQOL Group. Whoqol-Bref: Introduction, Administration, Scoring and Generic Version of the Assessment. World Health Organization, Geneva, Switzerland; 1996.
9. Islam MR, Gartoulla P, Bell RJ, Fradkin P, Davis SR. Prevalence of menopausal symptoms in Asian midlife women: A systematic review. Climacteric 2015;18:157-76.
10. Gartoulla P, Islam MR, Bell RJ, Davis SR. Prevalence of menopausal symptoms in Australian women at midlife: A systematic review. Climacteric 2014;17:529-39.
11. Freeman EW, Sherif K. Prevalence of hot flushes and night sweats around the world: A systematic review. Climacteric 2007;10:197-214.
12. Melby MK, Lock M, Kaufert P. Culture and symptom reporting at menopause. Hum Reprod Update 2005;11:495-512.
13. Palacios S, Henderson VW, Siseles N, Tan D, Villaseca P. Age of menopause and impact of climacteric symptoms by geographical region. Climacteric 2010;13:419-28.
14. Thomas F, Renaud F, Benefice E, de Meeüs T, Guegan JF. International variability of ages at menarche and menopause: Patterns and main determinants. Hum Biol 2001;73:271-90.
15. Kapur P, Sinha B, Pereira BM. Measuring climacteric symptoms and age at natural menopause in an Indian population using the Greene Climacteric Scale. Menopause 2009;16:378-84.
16. AlDughaither A, AlMutairy H, AlAteeq M. Menopausal symptoms and quality of life among Saudi women visiting primary care clinics in Riyadh, Saudi Arabia. Int J Womens Health 2015;7:645-53.
17. Chen Y, Lin SQ, Wei Y, Gao HL, Wu ZL. Menopause-specific quality of life satisfaction in community-dwelling menopausal women in China. Gynecol Endocrinol 2007;23:166-72.
18. Jha DK, Tripathi VK. Quality of life in slums of Varanasi city: A comparative study. Trans Inst Indian Geogr 2014;36:171-83.
19. Mageswari S, Geetha G. Women ' s Quality of Life – A comparative study between slum and resettlement colony of Chennai City. Imp J Interdiscip Res 2016;2:1626-31.
20. Govindaraju BM. Quality of life of slum women: A case study of Mangalore City. J Econ Sustain Dev 2012;3:1-8.
21. Chedraui P, Hidalgo L, Chavez D, Morocho N, Alvarado M, Huc A. Menopausal symptoms and associated risk factors among postmenopausal women screened for the metabolic syndrome. Arch Gynecol Obstet 2007;275:161-8.
22. Hidalgo LA, Chedraui PA, Morocho N, Alvarado M, Chavez D, Huc A. The metabolic syndrome among postmenopausal women in Ecuador. Gynecol Endocrinol 2006;22:447-54.
23. Dinger J, Zimmermann T, Heinemann LA, Stoehr D. Quality of life and hormone use: New validation results of MRS scale. Health Qual Life Outcomes 2006;4:32.
24. Heinemann LA, Potthoff P, Schneider HP. International versions of the Menopause Rating Scale (MRS). Health Qual Life Outcomes 2003;1:28.
25. Al-Musa HM, Ahmed RA, Alsamghan AS, Abadi S, Al-Saleem MAS, Alsabaani AAM, *et al.* The prevalence of symptoms experienced during menopause, influence of socio-demographic variables on symptoms and quality of life among women at Abha, Saudi Arabia. Biomed Res 2017;28:2587-95.
26. Bairy L, Adiga S, Bhat P, Bhat R. Prevalence of menopausal symptoms and quality of life after menopause in women from South India. Aust N Z J Obstet Gynaecol 2009;49:106-9.
27. Rahman S, Salehin F, Iqbal A. Menopausal symptoms assessment among middle age women in Kushtia, Bangladesh. BMC Res Notes 2011;4:188.
28. Chedraui P, Aguirre W, Hidalgo L, Fayad L. Assessing

menopausal symptoms among healthy middle aged women with the Menopause Rating Scale. Maturitas 2007;57:271-8.

29. Núñez-Pizarro JL, González-Luna A, Mezones-Holguín E, Blümel JE, Barón G, Bencosme A, *et al*. Association between anxiety and severe quality-of-life impairment in postmenopausal women: Analysis of a multicenter Latin American cross-sectional study. Menopause 2017;24:645-52.

30. Essa RM, Mahmoud NM. Factors associated with the severity of menopausal symptoms among menopausal women. IOSR J Nurs Heal Sci 2018;7:29-40.

31. Pérez JA, Garcia FC, Palacios S, Pérez M. Epidemiology of risk factors and symptoms associated with menopause in Spanish women. Maturitas 2009;62:30-6.

32. Sabia S, Fournier A, Mesrine S, Boutron-Ruault MC, Clavel-Chapelon F. Risk factors for onset of menopausal symptoms: Results from a large cohort study. Maturitas 2008;60:108-21.

33. Ford K, Sowers M, Crutchfield M, Wilson A, Jannausch M. A longitudinal study of the predictors of prevalence and severity of symptoms commonly associated with menopause. Menopause 2005;12:308-17.

34. Gallicchio L, Miller SR, Visvanathan K, Lewis LM, Babus J, Zacur H, *et al*. Cigarette smoking, estrogen levels, and hot flashes in midlife women. Maturitas 2006;53:133-43.

35. Murtagh MJ, Hepworth J. Menopause as a long-term risk to health: Implications of general practitioner accounts of prevention for women's choice and decision-making. Sociol Health Illn 2003;25:185-207.

36. Taylor LD, Daniels CK, Schmucker DL. Ageing compromises gastrointestinal mucosal immune response in the rhesus monkey. Immunology 1992;75:614-8.

37. Ghosh M, Rodriguez-Garcia M, Wira CR. The immune system in menopause: Pros and cons of hormone therapy. J Steroid Biochem Mol Biol 2014;142:171-5.

38. Ceylan B, Özerdoğan N. Factors affecting age of onset of menopause and determination of quality of life in menopause. Turk J Obstet Gynecol 2015;12:43-9.