Published in final edited form as:

Maturitas. 2018 February ; 108: 1–6. doi:10.1016/j.maturitas.2017.10.013.

Quality of life among postmenopausal women enrolled in the Minnesota Green Tea Trial

Allison Dostal Webster,
University of Minnesota

Deborah Finstad,
University of Minnesota

Mindy Kurzer, and
University of Minnesota

Carolyn Torkelson
University of Minnesota

Abstract

Background—Postmenopausal symptomatology has not been elucidated in large, long-term human clinical trials. Our objective was to measure quality of life in postmenopausal women aged 50–70 years.

Methods—A menopause-specific quality-of-life (MENQOL) questionnaire was completed by women enrolled in the Minnesota Green Tea Trial (n=932) to assess vasomotor, physical, sexual, and psychosocial symptoms in the years following menopause. Responses were coded; mean overall and domain scores ranged from 1 to 8. A higher score indicated more severe symptoms.

Results—Mean overall MENQOL scores were highest in women aged 50–54.9 years. A pattern of reduced symptom severity with increasing age was observed overall and within each domain. Women aged 50–54.9 years had more severe night sweats and sweating than other age groups (*P*

Corresponding author: Allison Dostal Webster, University of Minnesota, 516 Delaware St. SE, 6-240 Phillips-Wangenstein Building, United States.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Contributors

ADW was responsible for study conception and design, acquisition and analysis of data.

DF was responsible for analysis and interpretation of data.

MK was responsible for study conception and design, acquisition of data.

CT was responsible for study conception and design, acquisition and analysis of data.

Ethical approval

Institutional Review Board (IRB) approval was obtained at each clinical center and all participants provided written informed consent.

Conflict of interest

The authors declare that they have no conflict of interest.

Provenance and peer review

This article has undergone peer review.

Research data (data sharing and collaboration)

There are no linked research data sets for this paper. Data will be made available on request.

0.001) and more severe hot flashes than women aged ≥ 60 years ($P < 0.001$). No differences between age groups were seen on mean score in the Sexual domain. Compared with women aged 50.0–54.9 years (the reference group), study participants aged 60–64.9 and ≥ 65 years had lower MENQOL scores in the Psychosocial domain ($P = 0.029$ and $P < 0.001$). Women aged 50–54.9 years had more severe symptoms related to negative mood than women ≥ 65 years ($P = 0.009$). Compared with women aged 50–54.9 years, those in the age groups 60–64.9 and ≥ 65 years had lower scores for “poor memory” (2.98 ± 1.75 and 2.66 ± 1.68 vs. 3.43 ± 1.87 , $P < 0.001$). Women ≥ 65 years reported lower scores for “feeling tired or worn out”, “difficulty sleeping”, and “lack of energy” than all other age groups ($P = 0.003$).

Conclusion—The findings of this descriptive analysis of postmenopausal women may help clinicians counsel women about expectations and treatment options to address menopause-associated symptoms and the relationship between postmenopausal symptoms and overall health.

This trial was registered at clinicaltrials.gov as NCT00917735 on June 8, 2009.

Keywords

Green tea; quality of life; breast cancer; postmenopausal women; MENQOL

INTRODUCTION

Menopause is a normal physiologic event, defined by the World Health Organization (WHO) as the permanent cessation of menstruation resulting from loss of ovarian follicular function[1]. Spontaneous or natural menopause is recognized retrospectively after 12 months of amenorrhea[1]. It occurs at an average age of 52 years, but the age of natural menopause can vary widely from 40 to 58 years. Induced menopause refers to the cessation of menstruation that occurs after either bilateral oophorectomy or iatrogenic ablation of ovarian function (e.g., by chemotherapy or pelvic radiation).[2]

By the year 2025, the number of postmenopausal women is expected to rise to 1.1 billion worldwide.[2] Understanding the physical, emotional, and sexual repercussions of this important life stage is sure to prove valuable for the care of many women in the future. And yet, detailed information on a full spectrum of menopause-related symptoms is lacking in large randomized trials. Intervention studies targeted at postmenopausal women represent an excellent opportunity to evaluate quality of life in this demographic group. The Menopause-Specific Quality of Life (MENQOL) questionnaire[3, 4] is a validated and widely used research tool aimed at measuring condition-specific quality of life in postmenopausal women. Its use in both clinical and epidemiological research has been steadily increasing over the past two decades since it was first published. However, translation of its results into clinical practice has remained largely uncertain, possibly due to wide demographic variation and small sample sizes of many studies conducted to date.

In order to assess women’s menopausal state in a large data set, we looked to the results of the Minnesota Green Tea Trial (MGTT),[5] a placebo-controlled, double-blinded, randomized phase II clinical trial designed to investigate the effect of green tea extract (GTE) on risk factors for postmenopausal breast cancer. The MGTT randomized over one

thousand postmenopausal women at increased risk for breast cancer development due to high breast density to receive either GTE or placebo for 12 months. With its large sample of healthy postmenopausal women across a wide age range, examining quality of life issues of women enrolled in the MGTT provided an excellent chance to assess health status and needs of the aging woman. Menopause can be viewed as a sentinel event that affords a unique opportunity for a dialogue between women and their healthcare providers to evaluate and improve health-related practices. By considering women's concerns, values, and preferences, menopause practitioners have the potential to enhance women's sense of well-being not only at menopause, but for the remainder of their lives. The purpose of this analysis was to evaluate the psychometric properties of the MENQOL questionnaire in a sample of postmenopausal women across the ages of 50 to 70 years.

STUDY DESIGN AND METHODS

Participants

A detailed description of the Minnesota Green Tea Trial (MGTT) design, eligibility criteria, study conduct, and patient flow through the trial will be published separately.[5] Briefly, the study recruited postmenopausal women aged 50 to 70 years and classified as having high mammographic density from 2009 to 2013 in the Minneapolis-St. Paul metropolitan area. Of 1075 randomized women, 538 were assigned to receive four oral GTE capsules containing 1315 mg $\pm$ 116 total catechins per day (843 $\pm$ 44 mg as (-)-epigallocatechin-3-gallate [EGCG]) and 537 were randomized to receive placebo. Nine hundred thirty-seven women (87.2%) completed the study. Participants, investigators, laboratory staff, and those monitoring clinical outcomes and adverse events were blinded to treatment assignment. The primary objectives were to determine the effects of GTE supplementation on mammographic density, circulating reproductive hormones and circulating insulin-like growth factor axis proteins. Institutional Review Board (IRB) approval was obtained at each clinical center and all participants provided written informed consent.

No differences in any baseline or MENQOL variable were seen when comparing GTE and Placebo groups. Therefore, the following manuscript describes results obtained from analysis of the full study population, combining GTE and Placebo groups.

MENQOL-Intervention Questionnaire

The MENQOL-Intervention questionnaire[3, 4] was developed to assess side effects of specific therapies that may impact quality of life and consists of 32 items divided into four domains: vasomotor (3 items), psychosocial (7), physical (19) and sexual (3). At baseline (Month 0), participants were asked whether they had experienced each item in the previous week. If their response was 'no', the participant would proceed to the next item. If her response was, "yes", she indicated how bothered she was by the item on a 7-point Likert scale ranging from '0': 'not at all bothered' to '6': 'extremely bothered'. Therefore, a higher score is indicative of a higher degree of menopausal symptoms. For analysis, questionnaire scores were converted to 1 for a "no" response, 2 for "yes, not bothered" through to 8 for "yes, extremely bothered". Each domain score is the mean of the item scores forming that domain and can range from 1 to 8. MENQOL scores were organized categorically as

follows: No symptoms: 1.0, Mild to Moderate Symptoms: 1.01–3.67; and Moderate to High Symptoms: 3.68–8.0.

Health History Questionnaire

Each participant completed a baseline health history questionnaire that included information on demographics, lifestyle factors, medical history, medication use, and reproductive history. Participants also self-rated their overall health on a scale from 1 to 4, with 1 = Poor, 2 = Good, 3 = Very Good, and 4 = Excellent health.

Statistical Analysis

Although the MGT study had three data collection points, (baseline, 6 month, and 12 months), only baseline data were analyzed as no statistically significant changes were seen between time points (data not shown). Participant age was recoded from a continuous variable to four categories by five year increments; 50.0–54.9, 55.0–59.9, 60.0–64.9 and 65.0 years to determine if there were differences in symptom rating by age. Simple crosstab comparisons of demographics by age groups verified that there were no differences in the four groups for race, education, overall health and other demographic characteristics that may account for group differences. One-way between-subjects ANOVA tests were used to compare the average effect of age on MENQOL domains and symptoms between the four age groups. If the overall F-test was significant, the ANOVA was followed by post-hoc pairwise comparisons adjusted for multiple comparisons using the Tukey method. A two-way ANOVA was conducted on MENQOL sub-scales to determine the effect of overall self-assessed health and age on MENQOL scores. Our study population rated themselves as generally healthy overall, with none of the women selecting “Poor” overall health in the four point scale. There was no statistically significant interaction between the two variables for any of the MENQOL domains. Therefore, we removed age and ran a one-way ANOVA of the self-assessment of health with the four MENQOL domains followed by post-hoc pairwise comparisons adjusted using the Tukey method. SPSS 23.0 was used for all analyses.

RESULTS

Participants

Baseline demographics and participant information are presented in Table 1. On average, women were 59.9 years old, primarily white (96.4%), and had a mean BMI of 25.1 kg/m². No differences in race-ethnicity, education, or self-assessed general health status were noted between age groups. Participants in the 55–59.9 year age group were slightly older at menopause as compared to the 50–54.9 and 65 years groups ($P = 0.001$). Groups also varied in terms of past use of oral contraceptives ($P = 0.002$). Past use of systemic MHT was highest in the 65 years age group and lowest in the youngest age group; percentage of never smokers was highest in the 50–54.9 and 55–59.9 age groups as compared to the 60–64.9 and 65 years age groups, indicating a temporal effect in the known health consequences of MHT and smoking.

Overall Domain Scores

Baseline MENQOL-Intervention results were available for 932 participants. Information on each of the four domains by age group is shown in Figure 1. Mean overall MENQOL scores were highest in the 50–54.9 year age group (3.04), followed by those aged 55–59.9 years (2.90), 60–64.9 (2.76), and 65.0 (2.51). The distribution of symptom severity by age group was significantly different for Vasomotor, Physical, and Psychosocial domains and generally followed a predictable pattern of reduced symptom severity with increasing age (Table 2). No significant difference in distribution of symptoms by age was seen in the Sexual domain ($P = 0.11$). As demonstrated in Table 2, mean domain scores ranged from 2.01 to 3.66, indicating that overall symptomology of MENQOL variables was mild to moderate for all age groups. However, wide between-subjects variability was observed (Figure 1).

Vasomotor Symptoms

Post hoc comparisons using the Tukey HSD test indicated that the mean score for vasomotor symptoms was significantly higher in women less than 55 years old compared to the three older age groups (Table 2). Women aged 50–54.9 years demonstrated a statistically significant higher severity of night sweats and sweating as compared to the three other age groups ($P = 0.001$) and a higher severity of hot flashes as compared to women aged 60–64.9 and 65 years ($P < 0.001$) (Table 2). Consistent with overall MENQOL scores, a pattern of reduced symptom severity with increasing age was observed for symptoms within the Vasomotor domain.

Sexual Symptoms

No statistically significant differences between age groups were seen in mean MENQOL-Sexual domain score (Table 2, $P = 0.11$). However, when analyzed by individual question within the domain, women aged 55–59.9 y had an increased severity of “change in sexual desire” as compared to women in the 65 y age group (Table 2, 3.79 ± 2.35 vs. 3.17 ± 2.37 , $P = 0.046$). There was a significant difference overall for avoiding intimacy, but no between-age group differences were found. No differences were seen between age groups for vaginal dryness during intercourse.

Psychosocial Symptoms

As compared to women aged 50.0–54.9 y, study participants aged 60–64.9 and 65 y had lower MENQOL scores in the Psychosocial domain ($P = 0.029$ and $P < 0.001$, respectively, Table 2). Women aged 50–54.9 y tended to have a higher severity of symptoms related to negative mood when compared to women in the oldest age group, including feeling anxious or nervous, feeling depressed, being impatient with other people, and having feelings of wanting to be alone (all $P = 0.009$, Table 2). As compared to women aged 50–54.9 y, women aged 60–64.9 and 65 y reported reduced symptom severity of poor memory (2.98 ± 1.75 and 2.66 ± 1.68 vs. 3.43 ± 1.87 , $P < 0.001$). Symptom severity of poor memory was also statistically significantly lower in women aged 65 y as compared to those aged 55–59.9 y (2.66 ± 1.68 vs. 3.29 ± 1.83 , $P < 0.001$).

Physical Symptoms

The Physical domain is the largest subscale of the MENQOL and consists of 19 items addressing a wide range of symptoms. Of these, significant differences between age groups were reported mainly for symptoms addressing fatigue and changes in physical appearance (Table 2). Participants in the oldest age group reported lower severity scores for “feeling tired or worn out”, “difficulty sleeping”, and “lack of energy” as compared to all other age groups (all $P = 0.003$). Women aged 65 y also had lower scores for “weight gain” and “changes in appearance, texture, or tone of skin” as compared to all other age groups ($P < 0.001$ and $P = 0.045$, respectively). When comparing age groups, only women aged 65 y showed a statistically significant difference in overall Physical domain score as compared to participants in the youngest age group – a reduction of 0.31 from the mean score of women aged 50–54.9 y (2.53 ± 0.90 vs. 2.84 ± 1.08 , $P = 0.022$).

Urinary symptoms did not differ by age at any time point. Antidepressant use correlated with involuntary urination when laughing or coughing at each time point ($P < 0.001$, data not shown). Conversely, a higher number of days of exercise per week was associated with a lower degree of involuntary urination ($P < 0.04$, data not shown). However, when antidepressant use and exercise days were put into the same univariate model, exercise no longer remained a statistically significant variable. In women with a past history of oophorectomy, years since ovary removal was positively correlated with frequent urination ($P = 0.04$).

Effect of Self-reported Health Status

Post-hoc analysis of self-reported health status showed statistically significant differences between women who categorized their health as either Good, Very Good, or Excellent (Supplemental Table 1). Vasomotor and Sexual domain scores did not differ between groups. However, Psychosocial and Physical domains did show a statistically significant difference by self-assessed overall health (both $P = < 0.001$). Post-hoc pairwise comparisons showed that all groups (“Good”, “Very Good”, and “Excellent” health) were significantly different from each other, with mean scores decreasing as self-reported health status improved (all $P < 0.001$). A correlation of self-rating of health with other variables showed a positive correlation with days of exercise ($P < 0.001$) and a negative correlation with hours of sitting per week ($P = 0.03$), BMI ($P < 0.001$), and number of medications taken ($P < 0.001$). No interaction between age and health status was observed.

DISCUSSION

The Minnesota Green Tea Trial was a large randomized, controlled clinical trial primarily aimed at studying the impact of green tea extract supplementation on risk for postmenopausal breast cancer. In addition to this essential focus of the research hypothesis, this trial also allowed us a glimpse into the lives of postmenopausal women and their health issues. In particular, vasomotor and psychosocial symptoms stood out as important issues for women between 50 to 60 years of age – the youngest age groups in the MGTT. Vasomotor symptoms, a cardinal feature of menopause that are almost universally experienced by women, cause a substantial amount of distress and reduction in health related quality of life.

[6] Several studies[7, 8] have been conducted to address the duration and characterization of hot flashes, with most severe hot flashes occurring 7 to 10 years post-menopause. Our results confirm these findings, with vasomotor symptoms present in all groups but most severe in women less than 60 years of age.

The finding that women aged 50–54.9 y tended to have a higher severity of symptoms related to negative mood when compared to women in the oldest age group, including feeling anxious or nervous, feeling depressed, being impatient with other people, and having feelings of wanting to be alone is consistent with other studies.[9, 10] Marked physiological and psychosocial changes characterize this time in a woman's life, including symptoms such as hot flashes and night sweats, changes in body shape, shifting social roles and the onset of chronic illnesses. All of these factors may interact to facilitate the development of depressive symptoms during the menopause transition.[11] The transition through menopause can be a challenging and difficult time with many co-factors that exacerbate anxiety and depression, therefore, clinicians need to be alert to the conditions and provide an environment where discussion and referral for psychological support can be considered to manage symptoms.

The severity of poor memory was greater in woman aged 55–59.9 then in women > 65. Limited studies on the memory changes that occur during the transitional period to the postmenopausal state are available.[12] However, the work of Maki and associates demonstrate that midlife women frequently report memory problems during the menopausal transition.[13] Studies have validated concerns by showing significant correlations between memory complaints and performance on validated memory tasks. Estrogen appears to be essential for optimal brain function. it has been shown to increase cerebral blood flow, act as an anti-inflammatory agent, enhance activity at neuronal synapses, and exert direct neuroprotective and neurotrophic effects on brain tissue.[14] Maki also points out that longitudinal studies demonstrate modest declines in verbal memory during the menopausal transition followed by a rebound in memory during the postmenopausal stage.[13] Significant to these findings is that in clinical practice, normalizing memory complaints and reassuring patients that memory changes may be temporary and improve as one transitions to a postmenopausal state.

Sexual health in the aging population is a critical issue, but one that is not typically addressed in a comprehensive clinical visit. Sexual problems are highly prevalent in the midlife woman and are often associated with distress.[2] DiBonaventura, et al., demonstrated in his 2015 study of vaginal atrophy and quality of life that 40–54.2% of women reported moderate or severe vaginal dryness that resulted in clinically meaningful reductions in quality of life.[15] The MENQOL scores from our study demonstrated that women < 55 years of age experienced a statistically significant change in sexual desire and avoiding intimacy. These symptoms were noted in all age groups but younger postmenopausal women showed a higher degree of impact on their daily life. Our findings underscore the importance of clinicians talking to postmenopausal women about their sexual concerns and discussing interventions and treatment strategies.

Urinary incontinence affects 50% of midlife women but embarrassment and lack of awareness about effective treatment options prevent many women from seeking treatment.

[2] Work by Stenberg, et al.,[16] in Sweden concluded similar results where 73% of women reported some degree of urinary incontinence. In our study, urinary symptom results were limited because the MENQOL questionnaire included only two questions: frequent urination and involuntary urination when laughing or coughing. Yet, the findings do suggest that clinicians need to review medications, lifestyle habits and triggers that could flare urinary symptoms. As women age, urinary incontinence does not improve without intervention and can progress to a debilitating condition.

There were a number of strengths of the MGT. Its large sample size made it possible to delve deeper into specific age ranges and to detect statistically significant differences even for relatively uncommon conditions. We were able to correlate MENQOL results with endpoints assessed by our detailed health history questionnaire, which allowed us to explore proposed associations between menopausal symptoms and other health-related variables. Using the widely used and validated MENQOL-Intervention questionnaire provided consistency and enabled us to compare our results to the large body of previously published work using this same data collection tool. Despite these advantages, no clinical trial is without limitations. The generalizability of our findings is limited to healthy postmenopausal women, primarily Caucasian women who are not on systemic hormone therapy. Participants in this study were not as racially or ethnically diverse as compared to the populations of Minnesota or the United States as a whole. They also had a higher level of education as compared to state and national statistics [17,18] and were free of health conditions that may impact quality of life, such as diabetes and cancer. Yet, the observation that even healthy women experienced bothersome menopause-related symptoms indicates that these issues may be of greater significance to women living with concomitant diseases. While the wide age range of study participants (50–70 years) and large sample size gave us the opportunity to assess quality of life in postmenopausal women at different stages of aging, it also made the study susceptible to temporal effects that may influence overall health outcomes. This was particularly demonstrated by the differences in percentage of women who had ever smoked or used menopausal hormone therapy. Lastly, it is important to note that while establishing overall group means for health variables is vital for population health assessment, every woman has a unique menopausal experience that deserves individualized care by her health care providers. Wide variability in responses to the MENQOL in our study population affirms this statement.

CONCLUSION

Pooled results of 932 postmenopausal women enrolled in a 12-month phase II clinical trial highlight areas of concern that clearly affect quality of life for the aging woman. This descriptive analysis demonstrates a reduced pattern of symptom severity relating to vasomotor, mood and memory changes that may be reassuring to women when counseling them on age transitions. These findings indicate the need for clinicians to be pro-active and initiate conversation with women about expectations and treatment options relating to vasomotor symptoms, sexual health and psychosocial changes. Understanding how postmenopausal symptomology can impact overall health is a valuable tool in women's health care. Ongoing research into this dynamic time of life is essential to address the needs of this growing population of women.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Funding

Research reported in this publication was supported by the National Institutes of Health/National Cancer Institute grant R01 CA127236 and Award Number T32CA132670 from the National Cancer Institute. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Cancer Institute or the National Institutes of Health. The funding sources and study supplement provider did not contribute to the design or conduct of the study, nor to the writing or submission of this manuscript.

References

1. Research on the menopause in the 1990s. Report of a WHO Scientific Group. World Health Organ Tech Rep Ser. 1996; 866:1–107. [PubMed: 8942292]
2. Shifren JL, Gass ML. The North American Menopause Society recommendations for clinical care of midlife women. *Menopause*. 2014; 21(10):1038–62. [PubMed: 25225714]
3. Lewis JE, Hilditch JR, Wong CJ. Further psychometric property development of the Menopause-Specific Quality of Life questionnaire and development of a modified version. *MENQOL-Intervention questionnaire, Maturitas*. 2005; 50(3):209–21. [PubMed: 15734602]
4. Hilditch JR, Lewis J, Peter A, van Maris B, Ross A, Franssen E, Guyatt GH, Norton PG, Dunn E. A menopause-specific quality of life questionnaire: development and psychometric properties. *Maturitas*. 1996; 24(3):161–75. [PubMed: 8844630]
5. Samavat H, Dostal AM, Wang R, Bedell S, Emory TH, Ursin G, Torkelson CJ, Gross MD, Le CT, Yu MC, Yang CS, Yee D, Wu AH, Yuan JM, Kurzer MS. The Minnesota Green Tea Trial (MGTT), a randomized controlled trial of the efficacy of green tea extract on biomarkers of breast cancer risk: study rationale, design, methods, and participant characteristics. *Cancer causes & control : CCC*. 2015; 26(10):1405–1419. [PubMed: 26206423]
6. Santoro N. Perimenopause: From Research to Practice. *Journal of women's health (2002)*. 2016; 25(4):332–339.
7. Avis NE, Crawford SL, Greendale G, Bromberger JT, Everson-Rose SA, Gold EB, Hess R, Joffe H, Kravitz HM, Tepper PG, Thurston RC. Duration of menopausal vasomotor symptoms over the menopause transition. *JAMA Intern Med*. 2015; 175(4):531–9. [PubMed: 25686030]
8. Freeman EW, Sammel MD, Lin H, Liu Z, Gracia CR. Duration of menopausal hot flashes and associated risk factors. *Obstetrics and gynecology*. 2011; 117(5):1095–1104. [PubMed: 21508748]
9. Hickey M, Bryant C, Judd F. Evaluation and management of depressive and anxiety symptoms in midlife. *Climacteric*. 2012; 15(1):3–9.
10. Llana P, Garcia-Portilla MP, Llana-Suarez D, Armott B, Perez-Lopez FR. Depressive disorders and the menopause transition. *Maturitas*. 2012; 71(2):120–30. [PubMed: 22196311]
11. Almeida OP, Marsh K, Flicker L, Hickey M, Ford A, Sim M. Reducing depression during the menopausal transition: study protocol for a randomised controlled trial. *Trials*. 2014; 15:312. [PubMed: 25095797]
12. Koebele SV, Mennenga SE, Hiroi R, Quihuis AM, Hewitt LT, Poisson ML, George C, Mayer LP, Dyer CA, Aiken LS, Demers LM, Carson C, Bimonte-Nelson HA. Cognitive changes across the menopause transition: A longitudinal evaluation of the impact of age and ovarian status on spatial memory. *Horm Behav*. 2017; 87:96–114. [PubMed: 27793768]
13. Maki PM. Verbal memory and menopause. *Maturitas*. 2015; 82(3):288–90. [PubMed: 26433715]
14. Shepherd JE. Effects of estrogen on cognition mood, and degenerative brain diseases. *J Am Pharm Assoc (Wash)*. 2001; 41(2):221–8. [PubMed: 11297335]

15. DiBonaventura M, Luo X, Moffatt M, Bushmakina AG, Kumar M, Bobula J. The Association Between Vulvovaginal Atrophy Symptoms and Quality of Life Among Postmenopausal Women in the United States and Western Europe. *Journal of women's health* (2002). 2015; 24(9):713–722.
16. Stenberg A, Heimer G, Ulmsten U, Chattingius S. Prevalence of genitourinary and other climacteric symptoms in 61-year-old women. *Maturitas*. 1996; 24(1–2):31–36. [PubMed: 8794431]
17. MN State Demographic Center. U.S. Census Bureau; Jun 8. 2017 “Data by Topic: Age, Race & Ethnicity.” Dept of Administration. mn.gov/admin/demography/data-by-topic/age-race-ethnicity/
18. United States Census Bureau; Mar. 2017 "Educational Attainment in the United States:2016". <https://www.census.gov/data/tables/2016/demo/education-attainment/cps-detailed-tables.html>

Highlights

- The number of postmenopausal women is approaching 1 billion worldwide; yet, detailed information on a full spectrum of menopause-related symptoms is lacking in large randomized trials.
- In this study, menopausal symptoms were most severe in women aged 50–55 and severity consistently declined in older age groups.
- Vasomotor, mood, and memory changes were notably more severe in younger age groups.

Figure 1.
Mean MENQOL domain scores in MGTG participants, by age group.

Table 1

Baseline characteristics of MGT participants

	50 to 54.9 y (n = 182)	55 to 59.9 y (n = 307)	60 to 64.9 y (n = 274)	65.0 y (n = 169)	Total (n = 932)	P-value
Height, cm	165 ± 6.1	164 ± 8.2	163 ± 6.4 ^a	163 ± 6.0 ^a	164 ± 7.0	.002
Weight, kg	67.8 ± 9.9	67.5 ± 10.1	67.7 ± 9.8	68.3 ± 10.6	67.7 ± 10.1	.896
BMI, % (n)						.114
Underweight	0.6 (1)	0.0 (0)	0.4 (1)	0.0 (0)	0.2 (2)	
Normal	57.5 (104)	52.8 (160)	46.7 (127)	45.2 (76)	50.5 (467)	
Overweight	34.8 (63)	37.6 (114)	40.8 (111)	38.7 (65)	38.2 (353)	
Obese	7.2 (13)	9.6 (30)	12.1 (33)	16.1 (27)	11.0 (102)	
Race/Ethnicity, % (n)						.691
White	94.5 (172)	97.4 (299)	96.4 (264)	96.4 (163)	96.4 (898)	
American Indian or Alaska Native	0.5 (1)	0.0 (0)	0.4 (1)	0.0 (0)	0.2 (2)	
Asian	2.2 (4)	0.7 (2)	1.1 (3)	0.6 (1)	1.1 (10)	
Black or African American	1.1 (2)	0.3 (1)	1.1 (3)	0.6 (1)	0.7 (7)	
Native Hawaiian or Other Pacific Islander	0.0 (0)	0.0 (0)	0.0 (0)	0.6 (1)	0.1 (1)	
Hispanic	1.1 (2)	0.7 (2)	0.7 (2)	1.8 (3)	1.0 (9)	
More than One Race	0.0 (0)	0.7 (2)	0.4 (1)	0.0 (0)	0.3 (3)	
Participant Refusal	0.5 (1)	0.3 (1)	0.0 (2)	0.0 (0)	0.2 (2)	.248
Education, % (n)						
High School Grad	3.9 (7)	4.9 (15)	6.2 (17)	10.7 (18)	6.1 (57)	
Some College	19.9 (36)	19 (58)	17.9 (49)	21.3 (36)	19.2 (179)	
College Grad	47.5 (86)	47.5 (145)	45.6 (125)	36.1 (61)	45.0 (419)	
Masters/PhD/Professional	28.2 (51)	27.5 (84)	29.6 (81)	32.0 (54)	29.1 (271)	
Unknown	0.6 (1)	1.0 (3)	0.7 (2)	0.0 (0)	0.6 (6)	.096
General Health, % (n)						
Poor	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	
Good	11.0 (20)	15.4 (47)	14.8 (39)	18.2 (30)	14.8 (136)	
Very Good	50.8 (92)	52.8 (161)	59.4 (161)	49.1 (81)	53.7 (495)	
Excellent	38.1 (69)	31.8 (97)	26.9 (71)	32.7 (54)	31.6 (291)	.844
Parity status, % (n)						

	50 to 54.9 y (n = 182)	55 to 59.9 y (n = 307)	60 to 64.9 y (n = 274)	65.0 y (n = 169)	Total (n = 932)	P-value
<i>Nulliparous</i>	24.7 (45)	22.8 (70)	23.7 (65)	21.3 (36)	23.2 (216)	
<i>Parous</i>	74.7 (136)	76.5 (235)	75.2 (206)	78.7 (133)	76.2 (710)	
<i>Unknown</i>	0.5 (1)	0.7 (2)	1.1 (3)	0.0 (0)	0.6 (6)	
Age at Menopause, y	48.3 ± 4.38 ^b	49.8 ± 4.49 ^{ad}	49.5 ± 5.95	48.1 ± 6.97 ^b	49.1 ± 5.47	0.001
Type of menopause, % (n)						0.001
<i>Natural</i>	91.8 (167) ^{cd}	89.3 (274) ^d	82.5 (226) ^a	80.5 (136) ^{ab}	86.2 (803)	
<i>Surgical: bilateral oophorectomy</i>	1.6 (3) ^{cd}	5.5 (1) ^d	12.0 (33) ^a	15.4 (26) ^{ab}	8.5 (79)	
<i>Surgery: ovarian status unknown</i>	5.5 (10)	3.9 (12)	5.1 (14)	3.0 (5)	4.4 (41)	
<i>Unknown</i>	1.1 (2)	1.3 (4)	0.4 (1)	1.2 (2)	1.0 (9)	
Past use of systemic MHT, % (n)						< 0.001
<i>Yes</i>	10.0 (18) ^{bcd}	28.7 (87) ^{aed}	52.2 (142) ^{abd}	78.0 (131) ^{abc}	41.0 (378)	
<i>No</i>	90.0 (162)	71.3 (216)	47.8 (130)	22.0 (37)	59.0 (545)	
Past use of oral contraceptives, % (n)						0.002
<i>Yes</i>	83.9 (151)	83.7 (256)	91.9 (251) ^d	79.8 (134) ^c	85.4 (792)	
<i>No</i>	16.1 (29)	16.3 (50)	8.1 (22)	20.2 (34)	14.6 (135)	
Smoking status, % (n)						0.020
<i>Never</i>	71.4 (130) ^d	71.7 (222) ^d	68.2 (187)	58.0 (98) ^{ab}	68.3 (637)	
<i>Former</i>	28.0 (51)	27.0 (83)	31.8 (87)	42.0 (71)	31.3 (292)	
<i>Unknown</i>	0.5 (1)	0.7 (2)	0.0 (0)	0.0 (0)	0.6 (3)	
Alcohol, drinks/week	3.1 ± 2.4	3.5 ± 2.9	3.3 ± 3.0	3.8 ± 3.6	3.4 ± 3.0	.205
Physical activity, MET-h/week	45.1 ± 40.9	48.6 ± 55.7	39.1 ± 38.7	47.0 ± 46.1	44.8 ± 46.7	.089

Data reported as mean ± standard deviation or % (n). Superscript letters indicate significant differences between groups.

^a = 50–4.9 y,

^b = 55 – 59.9 y,

^c = 60 – 64.9 y,

^d = 65 y.

Abbreviations: BMI, body mass index; MET-h, metabolic equivalent hours; MGT, Minnesota Green Tea Trial; MHT, menopausal hormone therapy

Table 2

Mean baseline MENQOL scores of MGTG participants, by age group.*

Domain	50–54.9 y (n=182)	55–59.9 y (n=307)	60–64.9 y (n=274)	65 y (n=169)	P-value
Vasomotor					
Hot flashes	3.25 ± 2.02 ^{c,d}	2.88 ± 2.03 ^d	2.53 ± 1.94 ^a	2.15 ± 1.79 ^{a,b}	< .001
Night sweats	3.06 ± 2.09 ^{b,c,d}	2.44 ± 1.99 ^{a,d}	2.28 ± 1.86 ^a	1.92 ± 1.68 ^{a,b}	< .001
Sweating	2.70 ± 1.80 ^{b,c,d}	2.26 ± 1.69 ^a	2.22 ± 1.77 ^a	1.95 ± 1.61 ^a	.001
Overall score	3.00 ± 1.67 ^{b,c,d}	2.53 ± 1.66 ^{a,d}	2.34 ± 1.62 ^a	2.01 ± 1.43 ^{a,b}	< .001
Sexual					
Change in sexual desire	3.60 ± 2.28	3.79 ± 2.35 ^d	3.49 ± 2.43	3.17 ± 2.37 ^b	.046
Avoiding intimacy	3.21 ± 2.27	3.26 ± 2.33	2.84 ± 2.19	2.76 ± 2.27	.034
Vaginal dryness during intercourse	3.56 ± 2.35	3.93 ± 2.39	3.78 ± 2.42	3.70 ± 2.40	.398
Overall score	3.46 ± 2.04	3.66 ± 2.06	3.37 ± 2.07	3.21 ± 2.05	.111
Psychosocial					
Dissatisfaction with my personal life	2.43 ± 1.71	2.30 ± 1.74	2.20 ± 1.62	1.98 ± 1.55	.078
Feeling anxious or nervous	2.86 ± 1.77 ^d	2.67 ± 1.76 ^d	2.56 ± 1.75	2.25 ± 1.58 ^{a,b}	.009
Poor memory	3.43 ± 1.87 ^{c,d}	3.29 ± 1.83 ^d	2.98 ± 1.75 ^a	2.66 ± 1.68 ^{a,b}	< .001
Accomplishing less than I used to	3.27 ± 2.00	3.00 ± 1.92	3.10 ± 1.87	2.85 ± 1.74	.196
Feeling depressed, down or blue	2.63 ± 1.71 ^d	2.28 ± 1.71	2.27 ± 1.60	1.94 ± 1.35 ^a	.001
Being impatient with other people	3.02 ± 1.68 ^{c,d}	2.72 ± 1.69	2.58 ± 1.57 ^a	2.35 ± 1.42 ^a	.001
Feelings of wanting to be alone	2.51 ± 1.75 ^{c,d}	2.16 ± 1.59	2.09 ± 1.53 ^a	1.86 ± 1.43 ^a	.002
Overall score	2.89 ± 1.27 ^{c,d}	2.63 ± 1.33 ^d	2.54 ± 1.29 ^a	2.27 ± 1.12 ^{a,b}	< .001
Physical					
Flatulence (wind) or gas pains	2.88 ± 1.67	2.99 ± 1.88	3.11 ± 1.86	3.05 ± 1.96	.609
Aching in muscles and joints	3.40 ± 1.94	3.55 ± 2.02	3.68 ± 2.02	3.51 ± 1.89	.521

Domain	50–54.9 y (n=182)	55–59.9 y (n=307)	60–64.9 y (n=274)	65 y (n=169)	P-value
<i>Feeling tired or worn out</i>	3.88 ± 1.88 ^d	3.69 ± 1.84 ^d	3.47 ± 1.76 ^d	2.93 ± 1.63 ^{a,b,c}	< .001
<i>Difficulty sleeping</i>	3.81 ± 2.01 ^d	3.65 ± 2.18 ^d	3.58 ± 2.17 ^d	3.03 ± 1.88 ^{a,b,c}	.003
<i>Aches in back of neck or head</i>	3.04 ± 2.06 ^d	2.69 ± 1.95	2.78 ± 2.01	2.38 ± 1.76 ^a	.018
<i>Decrease in physical strength</i>	2.93 ± 2.00	2.73 ± 1.82	2.99 ± 1.78	2.94 ± 1.78	.350
<i>Decrease in stamina</i>	2.92 ± 1.86	2.92 ± 1.80	3.02 ± 1.77	2.82 ± 1.66	.688
<i>Lack of energy</i>	3.31 ± 1.91 ^d	3.17 ± 1.84 ^d	2.95 ± 1.71	2.60 ± 1.60 ^{a,b}	.001
<i>Dry skin</i>	3.15 ± 1.92	3.24 ± 1.87	3.30 ± 1.91	3.10 ± 1.80	.682
<i>Weight gain</i>	3.59 ± 2.32 ^d	3.06 ± 2.23 ^d	3.12 ± 2.30 ^d	2.36 ± 1.89 ^{a,b,c}	< .001
<i>Increased facial hair</i>	2.67 ± 1.88	2.55 ± 1.74	2.58 ± 1.90	2.30 ± 1.76	.251
<i>Changes in appearance, texture or tone of my skin</i>	3.17 ± 1.74 ^d	3.16 ± 1.84 ^d	3.15 ± 1.97 ^d	2.72 ± 1.68 ^{a,b,c}	.045
<i>Feeling bloated</i>	2.62 ± 1.79	2.53 ± 1.71	2.47 ± 1.87	2.27 ± 1.68	.291
<i>Low backache</i>	2.57 ± 1.96	2.35 ± 1.82	2.67 ± 1.98	2.41 ± 1.78	.165
<i>Frequent urination</i>	2.54 ± 1.70	2.54 ± 1.82	2.68 ± 1.88	2.53 ± 1.79	.721
<i>Involuntary urination when laughing or coughing</i>	2.40 ± 1.78	2.50 ± 1.89	2.56 ± 2.00	2.24 ± 1.72	.329
<i>Breast pain or tenderness</i>	1.62 ± 1.23	1.42 ± 0.88	1.49 ± 1.11	1.43 ± 0.95	.170
<i>Vaginal bleeding or spotting</i>	1.12 ± 0.42	1.10 ± 0.57	1.09 ± 0.35	1.07 ± 0.42	.811
<i>Leg pains or cramps</i>	2.28 ± 1.71	2.37 ± 1.85	2.57 ± 1.87	2.43 ± 1.75	.361
<i>Overall score</i>	2.84 ± 1.08 ^d	2.75 ± 0.97	2.80 ± 1.10 ^d	2.53 ± 0.90 ^{a,c}	.022

* Data expressed as mean ± standard deviation. Superscript letters indicate significant differences between groups.

^a = 50–54.9 y,

^b = 55–59.9 y,

^c = 60–64.9 y,

^d = 65 y

Abbreviations: MENQOL, menopause-specific quality of life questionnaire; MGTT, Minnesota Green Tea Trial.