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Effects of a self-care-based education and laughter yoga on chronic stress, menopausal symptoms, and salivary cortisol: A randomized controlled trial

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Dilek Karaoğlan Gülevi[1*] *and Hatice Bebiş*

Department of Nursing, Faculty of Health Sciences, Eastern Mediterranean University, Famagusta, North Cyprus via Mersin 10, Turkey

***For Correspondence**: Email: *dilek.karaoglan@emu.edu.tr*

Abstract

Menopause and its symptoms significantly affect women's physical, psychological, and social well-being, often resulting in chronic stress. Education based on the self-care model's three components—maintenance, monitoring, and management—combined with laughter yoga, a proven stress-reducing practice, may effectively aid in managing menopausal symptoms and stress. This randomized controlled trial investigated the impact of a menopause education program grounded in the self-care model and integrated with laughter yoga on menopausal symptoms, perceived stress, coping styles, and salivary cortisol among postmenopausal women. Sixty-four participants were randomly assigned to either an intervention group (n=32) or a control group (n=32). Data were collected using a Descriptive Information Form, the Perceived Stress Scale, the Menopause Symptoms Assessment Scale, the Coping Styles Inventory, and salivary cortisol measurements. After the intervention, significant improvements were observed in the intervention group's scale scores and salivary cortisol levels compared to the control group (p=0.001). The program successfully alleviated menopausal symptoms and reduced stress, with lower cortisol levels indicating positive physiological adaptation. Primary healthcare nurses are encouraged to integrate self-care–based education and affordable stress-reduction methods, such as laughter yoga, into menopausal counseling. Future studies with larger samples and extended follow-up periods are recommended to confirm these results. *(Afr J Reprod Health 2026; 30 [6]: 55-65).*

Keywords: Laughter yoga, menopause education, psychological stress, self-care, salivary cortisol

Résumé

La ménopause et ses symptômes affectent de manière significative le bien-être physique, psychologique et social des femmes, entraînant souvent un stress chronique. Une éducation fondée sur les trois composantes du modèle d'autosoins — le maintien, la surveillance et la gestion — combinée au yoga du rire, une pratique reconnue pour la réduction du stress, peut contribuer efficacement à la gestion des symptômes ménopausiques et du stress. Cet essai contrôlé randomisé a examiné l'impact d'un programme d'éducation à la ménopause basé sur le modèle d'autosoins et intégré au yoga du rire sur les symptômes de la ménopause, le stress perçu, les styles de coping et le cortisol salivaire chez des femmes postménopausées. Soixante-quatre participantes ont été réparties aléatoirement soit dans un groupe d'intervention (n = 32), soit dans un groupe témoin (n = 32). Les données ont été recueillies à l'aide d'un formulaire d'informations descriptives, de l'Échelle de Stress Perçu, de l'Échelle d'Évaluation des Symptômes de la Ménopause, de l'Inventaire des Styles de Coping, ainsi que par des mesures du cortisol salivaire. Après l'intervention, des améliorations significatives des scores des échelles et des niveaux de cortisol salivaire ont été observées dans le groupe d'intervention par rapport au groupe témoin (p = 0,001). Le programme a permis d'atténuer les symptômes ménopausiques et de réduire le stress, les niveaux plus faibles de cortisol indiquant une adaptation physiologique positive. Les infirmières en soins de santé primaires sont encouragées à intégrer des programmes éducatifs fondés sur l'autosoins et des méthodes de réduction du stress abordables, telles que le yoga du rire, dans le conseil ménopausique. Des études futures avec des échantillons plus larges et des périodes de suivi prolongées sont recommandées afin de confirmer ces résultats. *(Afr J Reprod Health 2026; 30 [6]: 55-65).*

Mots-clés: Yoga du rire, éducation à la ménopause, stress psychologique, autosoins, cortisol salivaire

Introduction

The global increase in life expectancy has prolonged women's exposure to menopausal transition and its accompanying physical, psychological, and social changes.[1-3] The multifaceted nature of these changes often hinders women's ability to maintain daily functioning and

heightens their risk of experiencing chronic stress.[4] Stress constitutes a biological and psychological response triggered by real or perceived threats. During menopause, it can frequently manifest as symptoms such as sadness, irritability, anxiety, fatigue, and impaired social relationships.[5-9] Concurrently, hormonal fluctuations during this period also contribute to an elevation in stress hormones, such as cortisol.[10-15] Notably, menopausal women often experience insufficient access to healthcare services for both menopausal symptoms and chronic stress, a disparity reportedly stemming from socio-cultural and economic factors.[9,16] Riegel's self-care model, which encompasses maintenance, monitoring, and management, underscores not only the importance of coping with chronic health conditions but also the individual's active role and responsibility in managing their own health.[17]

Consequently, fostering self-care capabilities in women is paramount for enabling them to effectively monitor and manage menopausal symptoms, alongside the chronic stress often associated with this life stage. Key components of this empowerment include enhancing their awareness of strategies to avoid or mitigate menopausal symptoms and stress (self-care maintenance), fostering recognition of individual stress responses (self-care monitoring), and promoting the adoption of evidence-based practices such as laughter yoga, which is noted in the literature for its effectiveness in preventing or alleviating stress (self-care management). Indeed, multiple studies have demonstrated that nurse-led menopause education can effectively reduce symptoms, while laughter yoga has proven beneficial in managing stress and anxiety. [1, 18, 19] The literature contains numerous studies on the components, underlying mechanisms, and documented psychological and physiological effects of laughter yoga interventions. Meta-analyses and randomized controlled trial evidence indicate that yoga interventions significantly reduce total menopausal symptoms, including psychological, somatic, vasomotor, and urogenital complaints, while also improving sleep quality, anxiety, and depressive symptoms. Furthermore, a recent systematic review has shown that laughter yoga is associated with reduced stress, anxiety, depression, and salivary cortisol levels in various populations. [20-22]

This randomized controlled trial examines the efficacy of a multimodal intervention combining self-care-based education with laughter yoga on biopsychosocial outcomes in menopausal women. The study tests the following null hypotheses:

H_{01}: There is no statistically significant difference in perceived stress level scores between participants in the intervention and control groups.

H_{02}: There is no statistically significant difference in menopausal symptom scores between participants in the intervention and control groups.

H_{03}: There is no statistically significant difference in stress coping style scores between participants in the intervention and control groups.

H_{04}: There is no statistically significant difference in salivary cortisol levels between

Methods

Design

This study was conducted as a randomized controlled trial (RCT) from November 2023 to February 2024. This randomized controlled trial used the CONSORT (Consolidated Standards of Reporting Trials) guideline in the reporting process (Figure 1).

Population and sampling

The target population consisted of community-dwelling women residing in Northern Cyprus. Women were eligible to participate if they were between 45 and 60 years of age, had experienced at least one year of amenorrhea, had no communication impairments, perceived themselves as persistently more stressed compared to their premenopausal period, were fluent in Turkish, and provided informed consent. Following the research announcement, 120 women expressed interest in participating. Of these, 78 met the predefined inclusion criteria and constituted the accessible population. Based on an a priori power analysis using G*Power software (version 3.1.9.2), the required sample size was calculated with reference to Karakaş's (2022) study on the effects of laughter yoga (effect size $d = 0.71$; $\alpha = 0.05$; power = 0.80).[23] The analysis indicated a minimum of 64 participants (32 per group) to detect significant between-group differences in the primary outcomes.

From the pool of 78 eligible and consenting participants, 14 were excluded. The remaining 64 participants were randomized into the intervention group (n = 32) or the control group (n = 32), using simple random sampling method. The study was completed with a total of 64 participants (Figure 1).

Data collection tools

Descriptive information form

Developed by the researchers based on the literature, this 27-item form collected sociodemographic and menopausal characteristics, including age, education level, and menopause history. [24,25]

Perceived stress scale (PSS)

Originally developed by Cohen S, Kamarck T and Mermelstein R. (1983) and adapted into Turkish by Kaya C, Tansey TN, Melekoglu M, Cakiroglu O and Chan F, the PSS consists of 14 items measuring perceived stress across two subscales: stress-related self-efficacy and feelings of helplessness. Items are scored on a 5-point Likert scale (0–4), producing total scores between 0 and 56, with higher scores indicating greater perceived stress. The Turkish version demonstrated a Cronbach's alpha of 0.87. [26]

Menopause symptoms assessment scale (MSAS)

Developed by Schneider H. P. G., Heinemann L. A. J., Rosemeier H. P., Potthoff, P. and Behre H. M. (2000) and adapted into Turkish by Gürkan, the MSAS includes 11 items across somatic, psychological, and urogenital domains. Items are rated on a 5-point Likert scale (0–4), yielding total scores from 0 to 44, with higher scores reflecting more severe symptoms. The Cronbach's alpha of the Turkish version was reported as 0.84.[27]

Coping styles inventory (CSI)

The CSI, developed by Folkman and Lazarus (1980) and adapted into Turkish by Şahin and Durak, contains 30 items and five subscales: self-confident, optimistic, submissive, helpless, and seeking social support. Items are rated on a 4-point Likert scale (0–3), with items 1 and 9 reverse-coded. Subscale scores are calculated by dividing the sum of item scores by the number of items per subscale. Higher scores on the self-confident, optimistic, and social support subscales indicate functional coping, whereas higher helpless and submissive scores indicate dysfunctional coping. Reported Cronbach's alpha values ranged from 0.69 to 0.72.[28]

Procedures

After obtaining written informed consent, baseline data and salivary cortisol samples were collected from all participants. The intervention was delivered by a researcher certified in International Laughter Yoga Leadership. The 32 women in the intervention group were organized into subgroups of 10–12, and sessions were conducted in a distraction-free community center room equipped with projection tools and interactive teaching materials. The eight-session program included 15–20 minutes of education followed by 20–30 minutes of laughter yoga in each session (Table 1).

The educational component, grounded in the self-care model, aimed to strengthen participants' chronic stress management skills. Content addressed self-care maintenance (sustaining stress-reducing behaviors), self-care monitoring (identifying stress symptoms), and self-care management (responding appropriately to stress). The curriculum was developed using relevant literature and reviewed by five expert public health nursing academics.The laughter yoga component complemented the educational content by promoting physical relaxation and psychological well-being. Sessions included warm-up activities (clapping, rhythmic movements), deep-breathing exercises, playful activities, simulated laughter, and guided transitions toward spontaneous group laughter. Each session ended with structured relaxation exercises.

The control group received no intervention. Pre- and post-test data and salivary cortisol samples were collected concurrently with the intervention group. As an ethical courtesy, a single session of the health education and laughter yoga program was offered to the control group after study completion.

Data analysis

Statistical Package for Social Sciences (SPSS) version 26.0 was used for data collection.

Table 1: Structure of the self-care education and laughter yoga nursing intervention

Session	Title	Content Summary	Methods and Tools	Duration
1	Introduction and Orientation + LY	Introduction to the program and its objectives; group cohesion activities; basic LY practice.	Visual presentation, ice-breaking activities, LY	45–50 min
2	Women's Health in Menopause + LY	Exploration of physical, emotional, and social changes during menopause.	Visual materials, interactive lecture, LY	45–50 min
3	Stress Related to Menopausal Symptoms + LY	Identification of menopause-related stressors and their psychological and physiological impacts.	Case discussions, group interaction, LY	45–50 min
4	Role of Self-Care in Menopause (Maintain, Monitor, Manage) + LY	Explanation of the concept of self-care and its relevance during menopause, focusing on its three dimensions: maintenance, monitoring, and management.	Lecture, Q&A, LY	45–50 min
5	Stress-Free Self-Care (Maintenance) Strategies + LY	Introduction of practical self-care strategies to alleviate chronic stress.	Group activities, real-life examples, LY	45–50 min
6	Monitoring Symptoms of Chronic Stress (Selfcare Monitoring) + LY	Techniques for identifying and tracking symptoms of stress; fostering self-awareness among participants.	Hands-on exercises, self-assessment forms, LY	45–50 min
7	Managing Menopausal Symptoms and Stress through Self-Care (management) + LY	Development of individualized self-care plans for coping with menopausal symptoms and associated stress.	Individual planning, guided reflection, LY	45–50 min
8	Final Evaluation of the Program + LY	Overall evaluation of the program, collection of participant feedback, and group reflection on LY practices.	Evaluation forms, open discussion, LY	45–50 min

LY = Laughter Yoga

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data. Chi-square test was performed to analyze categorical variables. The Kolmogorov–Smirnov test was used to assess normality. For comparisons between independent groups, normally distributed data were analyzed using the independent samples t-test, while non-normally distributed data were analyzed using the Mann–Whitney U test. For within-group comparisons, the Wilcoxon signed-rank test was employed. 95% confidence interval (CI) was applied for all analyses, and the margin of error was set at 5%.

Ethical considerations

Ethical approval was obtained from the Scientific Research and Publication Ethics Committee of Eastern Mediterranean University (number ETK00-2023-0059, dated 03/29/2023). Informed written consent was obtained from all participants.Permission to use the PSS, MSAS, and CSI was obtained via e-mail. The study was registered at ClinicalTrials.gov (NCT05901181).

Results

In this section, the main findings of the study derived from the statistical analyses are presented. In Table 2 in, the intervention group, the mean age was 55.5 ± 4.2 years.

The majority of participants had primary education (65.6%), were married (93.7%), unemployed (71.8%), reported a moderate income level (75.0%), and lived with their spouses and children (56.2%).

Table 2: Comparison of the descriptive characteristics of the intervention and control groups

	Intervention		**Control**		**X^2**	**p**
	n	**%**	**N**	**%**		
Age (Mean ± SD)	55.5±4.2		56.7±3.3		-1.317	**0.193**
Education level						
Illiterate	3	9.3	7	21.8	-	-
Primary school	21	65.6	21	65.6		
High school	6	18.7	3	9.38		
University and above	2	6.2	1	3.13		
Marital status						
Married	30	93.7	28	87.5	a	0.672
Single	2	6.2	4	12.5		
Employment status						
Employed	9	28.1	7	21.8	a	0.774
Unemployed	23	71.8	25	78.1		
Income status						
High	5	15.6	5	15.6	0.220	0.896
Moderate	24	75.0	25	78.1		
Low	3	9.3	2	6.2		
Lives						
Alone	2	6.2	2	6.2	2.716	0.438
With spouse	11	34.3	7	21.8		
With spouse and children	18	56.2	19	59.3		
With children only	1	3.1	4	12.5		
Perceived lack of privacy						
No	26	81.2	27	84.3	0.110	0.740
Yes	6	18.7	5	15.6		
Smoking status						
No	25	78.1	26	81.2	0.097	0.756
Yes	7	21.8	6	18.7		
Alcohol consumption						
No	31	96.8	32	100.0	a	0.313
Yes	1	3.1	0	0.0		
Chronic diseases						
No	18	56.2	15	46.8	0.563	0.453
Yes	14	43.7	17	53.1		

- Assumptions for the chi-square test were not met for some variables; a: Fisher's exact test

Most participants indicated no previous lack of privacy (81.2%), were non-smokers (78.1%), abstained from alcohol (96.88%), and 43.7% reported having at least one chronic disease.

In the control group, the mean age was 56.7 ± 3.3 years. Similar to the intervention group, most participants had primary education (65.6%), were married (87.5%), unemployed (78.1%), reported a moderate income level (78.1%), and lived with their spouses and children (59.3%). Additionally, 84.3% reported no lack of privacy, 81.2% were non-smokers, all abstained from alcohol (100%), and 53.1% had at least one chronic condition.

Across all sociodemographic variables, no statistically significant differences were detected between the intervention and control groups ($p > 0.05$), demonstrating that the groups were comparable at baseline.In Table 3; In the intervention group, PSS total scores showed a significant reduction ($p = 0.024$), as did the helplessness subscale ($p = 0.001$). The intervention group's posttest PSS mean ($\bar{X} = 32.7$; SD = 6.0) was significantly lower than that of the control group ($\bar{X} = 34.4$; SD = 5.6) ($p = 0.019$).

Table 3: Comparison of the pretest and posttest scores obtained from the PSS, MSAS, and CSI

		Pretest			Posttest			p_3
PSS	**Group**	**$\bar{x}$**	**SD**	**p_1**	**$\bar{x}$**	**SD**	**p_2**	
Stress related self-efficacy beliefs	Intervention	17.5	3.2	**0.45**	14.6	3.0	**0.001***	**0.001***
	Control	16.9	3.1		16.6	2.7		0.065
Stress related feelings of helplessness.	Intervention	18.5	3.2	0.86	15.0	4.2	**0.014***	**0.001***
	Control	18.7	4.3		17.7	4.2		0.230
PSS Total	Intervention	36.0	5.2	**0.09**	32.7	6.0	**0.024***	**0.019***
	Control	36.1	6.0		34.4	5.6		0.090
MSAS								
Somatic complaints	Intervention	8.3	3.6	**0.25**	5.88	3.9	0.361	**0.000***
	Control	7.3	3.2		6.6	3.1		0.261
Psychological complaints	Intervention	9.2	3.5	0.59	6.3	4.1	**0.026***	**0.000***
	Control	8.7	3.8		8.5	3.7		0.854
Urogenital complaints	Intervention	3.7	3.0	**0.25**	2.7	2.8	0.792	**0.008***
	Control	2.8	2.7		2.9	2.7		0.941
MSAS Total	Intervention	20.4	7.7	0.75	14.1	8.3	**0.011***	**0.000***
	Control	21.0	7.5		19.2	7.2		0.181
SCI								
Self-confident approach	Intervention	2.2	0.4	0.266	2.3	0.3	**0.024***	0.905
	Control	2.1	0.4		2.0	0.5		0.248
Helpless approach	Intervention	1.5	0.4	**0.040***	1.3	0.3	0.821	**0.005***
	Control	1.3	0.4		1.3	0.4		0.279
Submissive approach	Intervention	1.3	0.5	0.352	1.0	0.5	0.097	0.105
	Control	1.1	0.5		1.2	0.5		0.111
Optimistic approach	Intervention	2.1	0.6	0.648	2.4	0.5	**0.001***	**0.048**
	Control	2.0	0.5		2.1	0.4		0.690
Seeking of social support	Intervention	1.8	0.7	0.496	2.3	0.7	**0.001***	**0.011**
	Control	1.68	0.7		1.7	0.6		0.091

*p<0.05; p_1 - p_2: Between-group comparison at pretest (independent samples t-test); p_3: Between-group comparison at posttest (paired samples t-test)

Table 4: Comparison of the pretest and posttest salivary cortisol levels

		Pretest		Posttest		Mean	F	p	η^2
	Group	**$\bar{x}$**	**s**	**$\bar{x}$**	**s**	**difference**			
Salivary cortisol level	Intervention	**4.9**	2.1	**3.5**	1.7	1.6	4.025	**0.049***	0.062
	Control	4.2	2.5	5.4	3.7	-1.2			

***p<0.05 (ANCOVA)**

PSS scores decreased by 3.3 points in the intervention group and by 1.6 points in the control group, yielding a posttest difference of 1.6 points. The clinical effect size (Cohen's d) was 0.30.Table 3 also indicates significant improvements in the intervention group's MSAS total score ($p < 0.001$) and its somatic ($p < 0.001$) and psychological ($p < 0.001$) subscales. Additionally, significant pretest–posttest differences were observed in the CSI subscales: self-confident ($p = 0.024$), optimistic ($p = 0.001$), seeking social support ($p = 0.011$), and helpless approach ($p = 0.005$). Table 4 presents the pretest and posttest salivary cortisol levels of both groups. Posttest salivary cortisol levels in the intervention group were significantly lower than those in the control group ($p = 0.001$). The intervention group exhibited a decrease of 1.6 units, while the control group showed an increase of 1.2 units. The between-group difference in posttest cortisol levels was 1.9 units. ANCOVA analysis indicated a moderate clinical effect between the groups (Cohen's $\eta^2 = 0.062$).

Discussion

This study investigated the effects of a self-care-based health education program combined with laughter yoga on perceived stress levels, menopausal symptoms, coping strategies, and salivary cortisol levels in menopausal women. Menopause frequently presents challenges such as perceived loss of control, body image concerns, and emotional fluctuations, which can diminish self-care practices and self-efficacy.[29, 30] Prior research indicates that peri- and postmenopausal women often experience psychological symptoms, including anxiety, depression, irritability, cognitive impairments, and sleep disturbances. [31, 32, 33] At the outset of this study, participants in both the intervention and control groups exhibited similarly high levels of stress, menopausal symptoms, ineffective coping strategies, and salivary cortisol ($p > 0.05$).

Poorly managed stress—particularly in individuals lacking social support—can become chronic, exacerbating menopausal symptoms and amplifying their perceived severity. [34, 35] Inadequate self-care and diminished self-efficacy during this transitional period can profoundly impact social functioning and familial dynamics, though targeted interventions yield positive outcomes. [36, 37] Further studies posit that enhancing self-efficacy during menopause strengthens coping skills and life satisfaction. [37] Similarly, Vaziri S, Mollaoglu M and Tekin N. noted that psychological distress during menopause adversely affects quality of life, social engagement, and interpersonal relationships. [32] In this study, the intervention group demonstrated a significant reduction in PSS scores post-intervention, whereas the control group exhibited an increase, underscoring the program's efficacy in stress mitigation. However, the effect size (Cohen's $d = 0.30$) was small-to-moderate, lower than Karakaş H, Bahçeli PZ, and Akyol M. reported effect ($d = 0.71$). [23]

Laughter yoga has consistently demonstrated its efficacy in mitigating anxiety, depression, and stress. [38] Cha M Y, and Hong H S. observed its capacity to foster optimism, self-esteem, and mood in menopausal women. [39] A broader body of prior research indicates that laughter yoga not only augments optimism and self-esteem (Kuru Alici and Arikan Donmez) but also ameliorates depression, enhances sleep quality, strengthens stress control abilities, and contributes to an improved overall quality of life.[40, 41, 42] Furthermore, a meta-analysis corroborated these findings, concluding that laughter yoga positively impacts depression, sleep quality, and anxiety. [43] Social factors can precipitate stress and intensify menopausal symptoms. [8] Moreover, even physiological transitions, such as menopause, have been shown to elevate perceived stress levels. [39, 40] This study revealed a statistically significant reduction in the intervention group's scores on the "feelings of helplessness" subscale of the Perceived Stress Scale (PSS) ($p<0.05$). This finding suggests that women participating in the intervention group perceived life events as less stressful compared to their counterparts in the control group. These results underscore that self-care-based education—which comprehensively addresses stress monitoring, management, and maintenance—in conjunction with laughter yoga, serves not merely to impart knowledge but also to engage emotional and cognitive processes, thereby enhancing self-efficacy in coping with chronic stress related to menopause.

Coping styles represent dynamic cognitive-behavioral patterns that individuals employ when confronting stressful circumstances. Rather than being static traits, these adaptive mechanisms develop progressively through experiential learning, heightened self-awareness, and cognitive maturation. [44] The educational intervention in this study was specifically designed to systematically enable women to recognize their own stress responses (self-monitoring), develop protective strategies (maintenance), and adopt more effective coping mechanisms (management). As a result, the present study found that positive coping strategies such as self-confident, optimistic, and social support-seeking approaches were reinforced, while negative strategies, such as helpless approach diminished after receiving the self-care-based education and laughter yoga intervention ($p < 0.05$). The consistent use of interactive techniques throughout the training facilitated experience sharing and emotional awareness, thereby contributing to these positive changes in the participants' coping strategies.

Menopausal symptoms are frequently distressing for many women. Beyond the discomfort caused by vasomotor symptoms like hot flashes and sweating, these manifestations can

adversely impact women's mental health and overall well-being. [8] Fahami F, Nazari F and Ghasemi M. demonstrated that psychoeducation and group-based interventions empowered women to better comprehend physiological changes, discard misinformation, and adapt their lifestyles accordingly. This, in turn, attenuated the perceived severity of somatic symptoms.[45] Consistent with these findings, the present study observed a statistically significant reduction in the intervention group's scores on the MSAS and its somatic and psychological complaints subscales ($p<0.05$). Furthermore, a comparison of the posttest MSAS scores between the intervention and control groups revealed a statistically significant decrease in the somatic complaints of the intervention group ($p<0.05$).

One of the components of the intervention in this study was the laughter yoga. Aksoy Can A, Güner Emüş T, Değirmenci F, Buldum A, Aksu A and Vefikuluçay Yılmaz D. found that laughter yoga effectively attenuated vasomotor symptoms and enhanced sleep quality in menopausal women. [19] Similarly, Koca H U, Kucukkelepce D, Nacar G, çetin NS and Taşhan ST. reported that acupressure, laughter yoga, and mindfulness-based stress reduction programs decreased menopausal symptoms and improved the quality of life in postmenopausal women. [1] Consistent with these prior findings, the present study observed that laughter yoga exerted a significantly positive effect on menopausal symptoms. These results suggest that laughter yoga could serve as a viable alternative therapy for women experiencing severe menopausal symptoms. The observed reductions in participants' perceived chronic stress levels further indicate that the intervention bolstered their ability to cope with stress, which, in turn, facilitated symptom management during menopause. Collectively, these findings underscore that nurse-led, holistic interventions integrating both self-care-based education and laughter yoga can be instrumental in mitigating menopausal symptoms and substantially enhancing women's quality of life. Laughter yoga also induces various physiological effects. Laughter is known to increase oxygen saturation, heart rate, and respiratory rate, concurrently reducing blood pressure and salivary cortisol levels. [42, 43] Additionally, it promotes the release of endorphins and contributes to the balance of stress hormones. Yoga-based exercises are widely reported to contribute significantly to relaxation, mental well-being, and social bonding. [46] Numerous studies have demonstrated that laughter yoga can significantly reduce cortisol levels—a major biomarker of stress—across various populations, including adults and students. Lee J S and Lee S K. specifically found that laughter yoga led to a significant reduction in salivary cortisol levels among nursing students in South Korea. [47] Similarly, Fujisawa A, Ota A, Matsunaga M, Li Y, Kakizaki M, Naito H, and Yatsuya H. and Öztürk F O and Tezel A reported analogous findings among university students in Japan and nursing students in Türkiye, respectively. [42, 48] Furthermore, Meier M, Wirz, L, Dickinson P, and Pruessner J C. observed reduced cortisol responses to acute stress in healthy individuals. [49] In contrast to these findings, some studies have reported no significant effect. Heo E H, Kim S, Park H J, and Kil S Y. for instance, found no significant impact of laughter yoga on serum cortisol levels in hemodialysis patients.[50] Likewise, Cha M Y and Hong H S reported no effect of laughter yoga on cortisol levels in middle-aged women. [51]

To date, no prior studies have specifically examined salivary cortisol levels in menopausal women following laughter yoga interventions. In the current study, there was no statistically significant difference between the intervention and control groups in baseline salivary cortisol levels (4.90 vs. 4.24; $p>0.05$). However, post-intervention, salivary cortisol levels in the intervention group decreased by 1.66 units, while those in the control group rose by 1.24 units. This notable divergence indicates the effectiveness of the intervention in reducing salivary cortisol levels in menopausal women ($p<0.05$). The observed clinical effect size (Cohen's $\eta 2=0.062$) suggests a moderate effect. These findings compellingly suggest that self-care-based education and laughter yoga not only influence psychological outcomes but also produce favorable physiological responses to stress. These findings underscore that the self-care-based health education program combined with laughter yoga not only significantly improved psychological outcomes and coping strategies but also produced measurable physiological benefits, highlighting its multidimensional efficacy for menopausal women. In other words, the moderate effect size of laughter yoga on salivary cortisol levels as a physiological parameter is both

statistically and clinically significant. Combining self-care-based education with laughter yoga can be considered an innovative method for nurses to manage chronic stress related to menopause.

In conclusion, all null hypotheses of this study—positing no significant differences between the intervention and control groups regarding perceived stress, menopausal symptoms, coping styles, and salivary cortisol levels—were unequivocally rejected. The findings compellingly demonstrate that the health education program, grounded in the self-care model and complemented by the laughter yoga intervention, yielded significant and multidimensional beneficial effects on menopausal women.

The integration of self-care–based health education with laughter yoga, targeting the chronic stress that commonly accompanies menopause and affects many women, simultaneously enhanced psychological well-being and enabled participants to develop more effective coping strategies for chronic stress related to menopausal symptoms. This study provides a multidimensional, holistic, non-pharmacological intervention led by nurses for women managing the physiological and psychological challenges of menopause, thereby expanding the evidence base for such integrative approaches.

Limitations

This study had several limitations. First, salivary cortisol was measured only at pre- and post-intervention, limiting insight into temporal changes in physiological stress. Second, the relatively small sample and recruitment from a single region restrict generalizability. Third, outcomes were assessed only in the short term, leaving long-term effects unknown. Fourth, reliance on self-reported measures may have introduced response bias. Finally, conducting the intervention in a controlled setting may limit the applicability of findings to real-world conditions.

Relevance to clinical practice

This study is the first to integrate self-care education with laughter yoga for managing chronic stress in menopausal women. Grounded in the mid-range Self-Care Model, the intervention aimed to strengthen women's capacity to take responsibility for their health during menopause.Intervention effectiveness was assessed through both self-reported outcomes and an objective biomarker—salivary cortisol.Post-intervention findings showed reduced perceived stress, improved self-efficacy, and significantly decreased cortisol levels.

Overall, the results indicate that this holistic intervention supports both psychological and physiological well-being during menopause

Conclusion

The educational program, grounded in the Self-Care Model and complemented by laughter yoga, offers a holistic and innovative nursing approach for managing chronic stress during menopause. Laughter yoga effectively reduced physiological stress responses, including salivary cortisol levels, while providing emotional relief and supporting physiological recovery. Simultaneously, the self-care–based education strengthened women's self-efficacy in coping with menopausal symptoms and chronic stress.

Based on these outcomes, nurse-led self-care education should be expanded within primary healthcare services. Additionally, low-cost and easily implementable stress management strategies—such as laughter yoga—may be integrated into routine counseling to enhance support for menopausal women. Future research should include larger and more diverse samples to improve generalizability and explore cultural and socioeconomic variations. Longitudinal studies incorporating both psychological measures and biological markers, such as salivary cortisol, are recommended to evaluate long-term effects comprehensively

Contribution of authors

All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by D.K.G., and H.B. The first draft of the manuscript was written by D.K.G. and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

References

1. Koca HU, Kucukkelepce DS, Nacar G, Cetin NS , Tashan ST. The effects of acupressure, laughter yoga, and a mindfulness-based stress reduction program applied to postmenopausal women for menopause symptoms and quality of life. Menopause. 2024;31(10):879–

886. https://doi.org/10.1097/GME.0000000000002402
2. Yanikkerem E, Koltan SO, Tamay AG , Dikayak S. Relationship between women's attitude towards menopause and quality of life. Climacteric. 2012;15:552–562. DOI: 10.3109/13697137.2011.637651
3. Grindler NM , Santoro NF. Menopause and exercise. Menopause. 2015;22(12):1351–1358. DOI: 10.1097/GME.0000000000000536
4. The Menopause Charity. Menopause and stress. 2023 Apr 4. Available from: https://www.themenopausecharity.org/2023/04/04/menopause-and-stress/
5. Cetin OE , Eroglu K. Problems experienced by women during menopause and coping strategies. DEUH Fac Nurs e-J. 2015;8:219–225. Available from: https://dergipark.org.tr/tr/pub/deuhfed/issue/46801/586842
6. Veras AB, Rassi A, Valenca AM , Nardi AE. Prevalence of depressive and anxiety disorders in a Brazilian outpatient sample of menopausal women. Rev Psiquiatr Rio Gd Sul. 2006;28(2):130–134. Available from: https://www.scielo.br/j/rprs/a/Pnh9Cxrqx86M4FKgT3jkLww/?format=pdf
7. Engin E, Dulgerler S, Kavlak O , Ertem G. Self-perception, problem-solving skills, and hopelessness after menopause. Ege Univ Nurs J. 2006;22(1):135–145. Available from: https://dergipark.org.tr/tr/pub/egehemsire/issue/49610/635808
8. Arnot M, Emmott EH , Mace R. The relationship between social support, stressful events, and menopause symptoms. PLoS One. 2021;16(1):e0245444. https://doi.org/10.1371/journal.pone.0245444
9. Riegel B, Jaarsma T , Stromberg A. A middle-range theory of self-care of chronic illness. Adv Nurs Sci. 2012;35(3):194–204. DOI: 10.1097/ANS.0b013e318261b1ba
10. Stute P , Lozza-Fiacco S. Strategies to cope with stress and anxiety during the menopausal transition. Maturitas. 2022;166:1–13. https://doi.org/10.1016/j.maturitas.2022.07.015
11. Ertem G. Examining the quality of life of women after menopause. Int J Hum Sci. 2010;7:469–483. Available from: https://www.j-humansciences.com/ojs/index.php/IJHS/article/view/1063/492
12. Chen PL, Chao HT, Chou KR, Huang HM, Cheng SY, Utian WH , Liao YM. The Chinese Utian Quality of Life Scale for women around menopause: Translation and psychometric testing. Menopause. 2012;19:438–447. DOI:10.1097/gme.0b013e3182331178
13. Erkin O, Ardahan M , Kert A. The impact of menopause on women's quality of life. Gumus Univ J Health Sci. 2014;3:1095–1113. Available from: https://dergipark.org.tr/tr/pub/gumussagbil/issue/23831/253872
14. Abay H ,Kaplan S. How does menopause affect quality of life? Ankara J Health Sci. 2015;4(1):1–24. https://doi.org/10.1501/Asbd_0000000048
15. Choi SMK, Choi IS, Jang MN , Yeon S. The relationship among menopausal symptoms, competency of self-care agency and social support in middle-aged women. J Korean Clin Nurs Res. 2015;21(1):105–115. https://doi.org/10.22650/JKCNR.2015.21.1.105
16. Durna Z. Chronic diseases and their importance. In: Durna Z, editor. Chronic diseases and care. Istanbul: Nobel Tip Kitabevleri; 2012. p. 1–7.
17. Jin Y, Bhattarai M, Kuo WC ,Bratzke LC. Relationship between resilience and self-care in people with chronic conditions: A systematic review and meta-analysis. J Clin Nurs. 2023;32(9–10):2041–2055. DOI: 10.1111/jocn.16258
18. Laughter Yoga University. About laughter yoga. 2023. Available from: https://laughteryoga.org/laughter-yoga/about-laughter-yoga/
19. Aksoy-Can A, Guner-Emul T, Degirmenci F, Buldum A, Aksu A , Vefikulucay-Yilmaz D. The effect of laughter yoga on vasomotor symptoms and sleep quality in menopausal women: A randomized controlled trial. Holist Nurs Pract. 2024. https://doi.org/10.1097/HNP.0000000000000690
20. Cramer H, Peng W and Lauche R. Yoga for menopausal symptoms — A systematic review and meta analysis. Maturitas, 2018: 109, 13–25. https://doi.org/10.1016/j.maturitas.2017.12.005 PubMed+1
21. Wang HJ, Liu YQ, Kwok JYY, Xu F, Li RZ. The effectiveness of yoga on menopausal symptoms: A systematic review and meta analysis of randomized controlled trials. [International Journal of Nursing Studies]. PubMed 2024.
22. Erkin Ö, Kocaçal E. The impact of laughter yoga as a non invasive complementary intervention on health parameters: A systematic review. BMC Complementary Medicine and Therapies, 2024; 24, 378. https://doi.org/10.1186/s12906-024-04663-3
23. Karakas H, Bahceli PZ, Akyol M. The effects of laughter therapy on perceived stress and quality of life in women with breast cancer receiving chemotherapy: A parallel-group randomized controlled pilot trial. Cancer Nurs. 2022. DOI: 10.1097/NCC.0000000000001403
24. Aksoy AC. The effect of acupressure applied to menopausal women on menopausal symptoms and quality of life [dissertation]. Mersin (TR): Mersin University; 2022.
25. Armat MR, Emami Zeydi A, Mokarami H, Nakhlband A,Hojjat SK. The impact of laughter yoga on depression and anxiety among retired women: A randomized controlled clinical trial. J Women Aging. 2022;34(1):31–42. doi:10.1080/08952841.2020.1774225
26. Kaya C, Tansey TN, Melekoglu M, Cakiroglu O , Chan F. Psychometric evaluation of Turkish version of the Perceived Stress Scale with Turkish college students. J Ment Health. 2019;28(2):161–167. DOI: 10.1080/09638237.2017.1417566
27. Can-Gurkan O. Reliability and validity of the Turkish form of the Menopause Symptoms Assessment Scale. Nursing Forum. 2005;30–35. Available from:

https://toad.halileksi.net/wpcontent/uploads/2022/07/menopoz-semptomlaridegerlatma-olcegi-toad.pdf
28. Sahin NH , Durak A. The Coping Styles Scale: Adaptation for university students. Turk J Psychol. 1995;10(34):56–73. Available from: https://www.researchgate.net/publication/227854958_stresle_basacikma_tarzlari_olcegi_universite_ogrencileri_icin_uyarlanmasi
29. Avis NE, Crawford SL , Greendale G. Psychological symptoms during the menopausal transition: Longitudinal data from the Study of Women's Health Across the Nation (SWAN). Menopause. 2020;27(10):1147–1155. https://doi.org/10.1097/GME.0000000000001596
30. Vincent C, Bodnaruc AM, Prud'homme D, Olson V , Giroux I. Associations between menopause and body image: A systematic review. Women's Health (Lond). 2023;19:17455057231209536. https://doi.org/10.1177/17455057231209536
31. Ayaz S, Aydemir H , Tunc S. Psychological symptoms and quality of life of menopausal women: The Turkish example. J Women's Health Nurs. 2022;8(1):21–29.
32. Vaziri S, Mollaoglu M , Tekin N. Investigation of the relationship between menopausal symptoms and anxiety-depression levels. Turk J Health Res. 2023;5(1):13–20. doi: 10.1002/hsr2.2267
33. Alblooshi S, Taylor M , Gill N. Does menopause elevate the risk for developing depression and anxiety? Results from a systematic review. Australas Psychiatry. 2023;31(2):165–173. https://doi.org/10.1177/10398562231165439
34. Cheng MH, Wang SJ , Lee JT. Self-efficacy and mental health among menopausal women: A cross-sectional analysis. Maturitas. 2022;159:24–30. https://doi.org/10.1016/j.maturitas.2022.01.006
35. Divya KL, Nimithamohan K, Bilimale AS, Muralidhar K, Krupp K and Madhivanan P. Role of social support in reducing the severity of menopausal symptoms among women living in rural Mysuru, Karnataka: An analytical cross-sectional study. J Midlife Health. 2024;15(1):12–18. doi:10.4103/jmh.jmh_180_23
36. Hossein Mirzaee Beni Z, Maasoumi R, Pashaeypoor S and Haghani S. The effects of self-care education based on the health literacy index on self-care and quality of life among menopausal women: A randomized clinical trial. BMC Women's Health. 2022;22:452. https://doi.org/10.1186/s12905-022-02007-2
37. Schwarzer R and Warner LM. Perceived self-efficacy and resilience in midlife health transitions. In: Ungar M, editor. Multisystemic resilience: Adaptation and transformation in contexts of change. Oxford: Oxford University Press; 2019. p.228–242.
38. Kaya KC, Ozkan CG and Agis D. Effects of laughter yoga practiced by the first-year nursing students before clinical practice on their perceptions of stress and meaning of life: A randomized controlled trial. BMC Nurs. 2025;24:41. https://doi.org/10.1186/s12912-024-02642-0
39. Cha MY and Hong HS. Effects on the laughter score, cortisol and immunoglobulin of laughter therapy in middle-aged women. J Korean Biol Nurs Sci. 2013;15(4):230–236. https://doi.org/10.7586/jkbns.2013.15.4.230
40. Kuru Alici N , Arikan Donmez A. A systematic review of the effect of laughter yoga on physical function and psychosocial outcomes in older adults. Complement Ther Clin Pract. 2020;41:101252. doi:10.1016/j.ctcp.2020.101252
41. Cho EA , Oh HE. Effects of laughter therapy on depression, quality of life, resilience and immune responses in breast cancer survivors. J Korean Acad Nurs. 2011;41(3):285–293. https://doi.org/10.4040/jkan.2011.41.3.285
42. Ozturk FO , Tezel A. Effect of laughter yoga on mental symptoms and salivary cortisol levels in first-year nursing students: A randomized controlled trial. Int J Nurs Pract. 2021. https://doi.org/10.1111/ijn.12924
43. Zhao J, Yin H, Zhang G, Li G, Shang B, Wang C and Chen L. A meta-analysis of randomized controlled trials of laughter and humor interventions on depression, anxiety, and sleep quality in adults. J Adv Nurs. 2019;75(11):2435–2448. https://doi.org/10.1111/jan.14000
44. Folkman S , Moskowitz JT. Coping: Pitfalls and promise. Annu Rev Psychol. 2004;55:745–774. https://doi.org/10.1146/annurev.psych.55.090902.141456
45. Fahami F, Nazari F ,Ghasemi M. Effect of group education on menopausal symptoms: A randomized clinical trial. J Midwifery Reprod Health. 2021;9(1):2594–2601.
46. Cheung M , Leung CA. Laughter yoga as a social work intervention. Smith Coll Stud Soc Work. 2020;90(4):288–301. https://doi.org/10.1080/00377317.2020.1819938
47. Lee JS and Lee SK. The effects of laughter therapy for the relief of employment-stress in Korean student nurses by assessing psychological stress, salivary cortisol and subjective happiness. Osong Public Health Res Perspect. 2020;11(1):44–52. https://doi.org/10.24171/j.phrp.2020.11.1.07
48. Fujisawa A, Ota A, Matsunaga M, Li Y, Kakizaki M, Naito H and Yatsuya H. Effect of laughter yoga on salivary cortisol and dehydroepiandrosterone among healthy university students: A randomized controlled trial. Complement Ther Clin Pract. 2018;32:6–11. https://doi.org/10.1016/j.ctcp.2018.04.005
49. Meier M, Wirz L, Dickinson P and Pruessner JC. Laughter yoga reduces the cortisol response to acute stress in healthy individuals. Stress. 2020;24(1):44–52. https://doi.org/10.1080/10253890.2020.1766018
50. Heo EH, Kim S, Park HJ and Kil SY. The effects of a simulated laughter programme on mood, cortisol levels, and health-related quality of life among haemodialysis patients. Complement Ther Clin Pract. 2016;25:1–7. https://doi.org/10.1016/j.ctcp.2016.07.001
51. Cha MY and Hong HS. Effects on the laughter score, cortisol and immunoglobulin of laughter therapy in middle-aged women. J Korean Biol Nurs Sci. 2013;15(4):230–236. https://doi.org/10.7586/jkbns.2013.15.4.230.