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ORIGINAL ARTICLE

The effect of tele-yoga training in healthy women on menstrual symptoms, quality of life, anxiety-depression level, body awareness, and self-esteem during COVID-19 pandemic

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Abstract

Background and aims This study was planned to examine the effects of tele-yoga training on menstrual symptoms, quality of life, anxiety-depression level, body awareness, and self-esteem in healthy women.

Methods Thirty-two healthy premenopausal women between the ages of 18 and 45 were included in the study. The women were randomly divided into two groups as tele-yoga training (*n*: 16) and the control group (*n*: 16). The tele-yoga training was performed on the Zoom software for 6 weeks, 2 times a week and 45 min a day. No intervention was made in the control group. Menstrual pain and symptoms by Menstrual Symptom Scale (MSS), quality of life by Nottingham Health Profile (NHP), depression levels by Beck Depression Scale (BDS), anxiety levels by State and Trait Anxiety Scale (STAI), body awareness by Body Awareness Questionnaire (BAQ), and self-esteem by Rosenberg Self-Esteem Scale (RSES) were determined.

Results In the tele-yoga training group, statistically significant improvements were observed in the MSS total ($p=0.001$), negative effects ($p=0.003$), menstrual pain symptoms ($p=0.003$), coping methods ($p=0.001$) sub-parameters, BDS score ($p=0.000$), NHP sleep ($p=0.021$), energy ($p=0.002$), emotional ($p=0.000$), and isolation ($p=0.039$) sub-parameters. In the control group, there was statistically significant worsening in the NHP total score ($p=0.000$). As regards the differences in values between the two groups, there were statistically difference in favor of the training group in sub-parameters of MSS, NHP sleep, energy, emotional, and isolation sub-parameters, and BDS and BAQ scores ($p<0.05$).

Conclusion It is thought that tele-yoga training may be a safe and effective method in reducing menstrual symptoms and depression, increasing quality of life, and body awareness.

Keywords Anxiety-depression · Menstrual symptoms · Quality of life · Telerehabilitation · Yoga

Background

Healthy women experience physiological and psychological changes in the menstrual cycle throughout their lives in the premenopausal period. In addition to the symptoms that menstruation creates on women, the COVID-19 epidemic process has affected the physical, emotional, and social conditions of all humanity, as well as affected women in this process and made their life difficult to cope with problems. In order to prevent the COVID-19 epidemic all over the world, the social isolation process was started quickly, and daily life routines and habits suddenly changed. The sudden difference in this lifestyle, adaptation to this process, and the fear of getting catch up the deadly COVID-19 disease are the main reasons for the factors affecting participation in social life in women.

Pharmacological and non-pharmacological treatment methods are recommended for women with menstrual symptoms. Pharmacological treatment methods include non-steroidal anti-inflammatory drugs along with pain relievers and oral contraceptives [1, 2]. Non-pharmacological treatment methods are acupuncture, acupressure, transcutaneous electrical nerve stimulation (tens), yoga, exercise programs, massage and relaxation methods, vitamin-mineral support,

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and herbal therapies. Yoga is one of the methods of self-improvement and exercise that fully trains the soul, mind, and body and allows the individual to recognize him or herself. Yoga, which is a mental journey of the individual to his/her inner world, is a technique that allows a person to be alone with him/herself as a result of the combination of physical posture, breathing techniques, and mental meditation. The yoga-based lifestyle includes positive behavioral changes (yamas and niyamas), physical posture practices (asanas), breathe regulation (pranayama), control of the senses (pratyahara), and meditative techniques (dharana, dhyana, and samadhi) [3].

Many studies on this subject have shown that regular yoga exercises provide significant health benefits [4–9]. It has been determined that yoga exercises have positive effects on the emotions and physical condition of individuals [5]. According to these studies, yoga may be effective in the treatment of musculoskeletal diseases such as osteoarthritis [6], osteoporosis [7], carpal tunnel syndrome, hyper kyphosis [8], and low back pain. It has been shown that regular yoga training has positive effects on menstrual symptoms and psychological well-being by balancing the neuroendocrine axis [9].

Regular exercise is known to reduce the frequency and severity of menstrual symptoms. Studies have shown that symptoms and pain levels decrease in women who exercise regularly, and this decrease may be due to hormonal changes in the uterine epithelial tissues or an increase in endorphin levels [10, 11]. In the literature, yoga has been determined to reduce menstrual cramps and distress, and it has also been reported that it can be used in menstrual problems because it is safe, has no side effects, is low in cost, easily accessible, and noninvasive [12].

The health services have also rearranged their treatment approaches to reach patients during the COVID-19 pandemic. The concept of telerehabilitation (TR) has become widespread and has taken an important role in treatment. It has been found important and valuable by researchers as a method to determine its effectiveness in the literature. TR enables the patients to access the rehabilitation service remotely by making use of the electronic information and communication technology of the rehabilitation service. The TR system is a system that ensures the continuity of the rehabilitation process by communicating regularly with individuals in rehabilitation education [13]. TR applications in a person's own social life eliminate difficulties in transportation and treatment sessions. TR is an important treatment option for cost savings, protection of health, and easy accessibility. With TR, individuals have the opportunity to exchange ideas with their physiotherapists [14]. The individual's involvement in the follow-up treatment of her own problem is achieved by accepting the responsibility of the individual and adapting him/her to the exercise [15]. In this period, when the COVID-19 process affected humanity in every aspect, yoga training attracted attention among exercises with its holistic approach. The positive effects of face-to-face yoga training on women's health have been proven in the literature. There are only a few studies in the literature on the effectiveness of yoga exercises practiced with the TR method, and it is emphasized that more studies are needed [16, 17]. On the other hand, no study carried out on healthy women, in whom yoga training was applied with TR method exists within our knowledge.

In the light of this information, we wanted to determine the effectiveness of yoga exercises applied with the TR method in women, who are among the most affected groups during the pandemic process, instead of traditional yoga classes. Therefore, the aim of our planned study is to examine the effects of tele-yoga training in healthy women during the lockdown period of COVID-19 pandemic on menstrual symptoms, quality of life, depression, anxiety levels, body awareness, and self-esteem.

Materials and method

Participants

Our study, which aims to examine the effectiveness of yoga training applied with the telerehabilitation method in healthy women during the COVID-19 pandemic lockdown period, was carried out on healthy women in the premenopausal period between the ages of 18 and 45 who volunteered to participate in the research and met the inclusion criteria. After the necessary verbal explanations about the study to the individuals who meet the inclusion criteria are received by the physiotherapist in charge of the research, their written consents were obtained through the informed consent form [18–20].

Inclusion and exclusion criteria

Healthy women without any spinal disease or deformity with ongoing menstrual cycle, between the ages of 18 and 45, who did not take any medication and mineral supplements during the last three menstrual cycles, were physically or perceptually competent to exercise, and have never done yoga before were included in this study.

Women with musculoskeletal system, neurological, severe cardiopulmonary, chronic systemic, psychiatric, balance and coordination problems, vestibular system disease, menstrual period problems (e.g., dysmenorrhea) pregnancy history that may prevent exercise, and women taking hormone replacement therapy were not included in this study.

Study design intervention

The women were divided into 2 different groups as tele-yoga training group and control group by simple randomization method. Neither the investigator collected pre- and post-data nor the subjects were aware of whether they had been allocated to the tele-yoga training ($n = 16$) or to the control group ($n = 16$). Assessments and treatments of participants were performed by different physiotherapists. An independent therapist, not involved in the study, picked an envelope for each patient. Thus, both the subjects and the assessors were blinded to the allocation group of the patients [20, 21]. The Hatha yoga training was applied to the individuals in the exercise group for 6 weeks, 2 days a week, 45 min each session, with a researcher physiotherapist who has a yoga instructor certificate via the zoom application. Individuals in the control group were not included in any exercise training program and were evaluated only before and after the 6 weeks.

Hatha yoga exercise training program

The upper extremity, trunk, abdomen, back, and lower extremity muscles were stretched and strengthened separately in Hatha yoga exercise training program. The yoga program consists of general warm-up asanas and the Hatha suryanamaskar series, basic asanas, pranamayama (breathing) techniques, and closing asanas. The basic asanas consist of asanas that increase hip and spine flexibility.

The warm-up asanas consist of 7 asanas and last for 2.5 min (Fig. 1). After warming up, the Hatha suryanamaskar series is performed 3 times and takes 15 min (Fig. 2). The basic asanas consist of 11 asanas and take 3.5 min (Fig. 3). The closing asanas consist of 6 asanas and last 3 min. Following the closing asanas, savasana that is a deep relaxation pose takes 15 min (Fig. 4). The 3 breathing (pranayama) exercises consist of sitali, ujjayi, and nadhi shodhana techniques take 5 min (Figs. 5, 6, and 7). Snapshots of the Hatha yoga program applied with telerehabilitation are included in the figures.

All women participating in the tele-yoga training were shown the easy forms of the movements before the training by the physiotherapist, then the woman chose the posture that was suitable for her. The participants were observed by the physiotherapist and the standing points were corrected with verbal warnings during online training. Thus, it was aimed to prevent the risk of possible injury.

Control group

The healthy women in the control group did not apply any exercise program. Exercise training was not given to the women in the control group, they were evaluated at the end and beginning of the study twice in total, with an interval of 6 weeks.

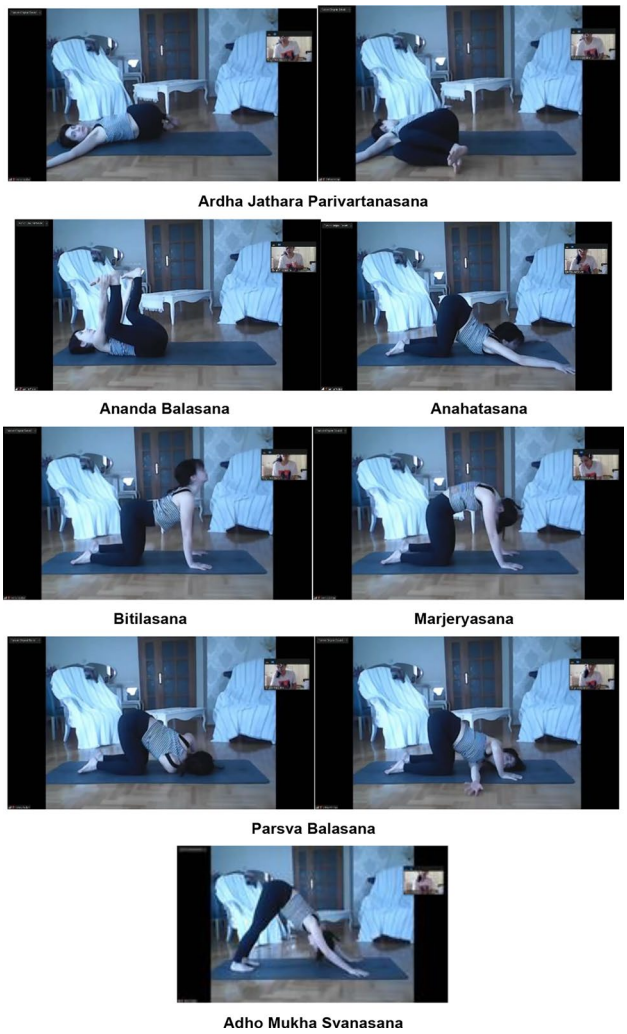

Fig. 1 Warm-up asanas

Outcome measurements

All women participating in the study were evaluated by sending a link to the online form twice at the beginning and end of the research. Anthropometric and sociodemographic information such as age, height, weight, marital status, and educational status were recorded after the necessary information and explanations were given to the patients before the evaluations and trainings.

Menstrual pain and symptoms

The Menstruation Symptom Scale (MSS), its Turkish validity and reliability were developed by Güvenç et al., was used to evaluate the menstrual pain and symptoms

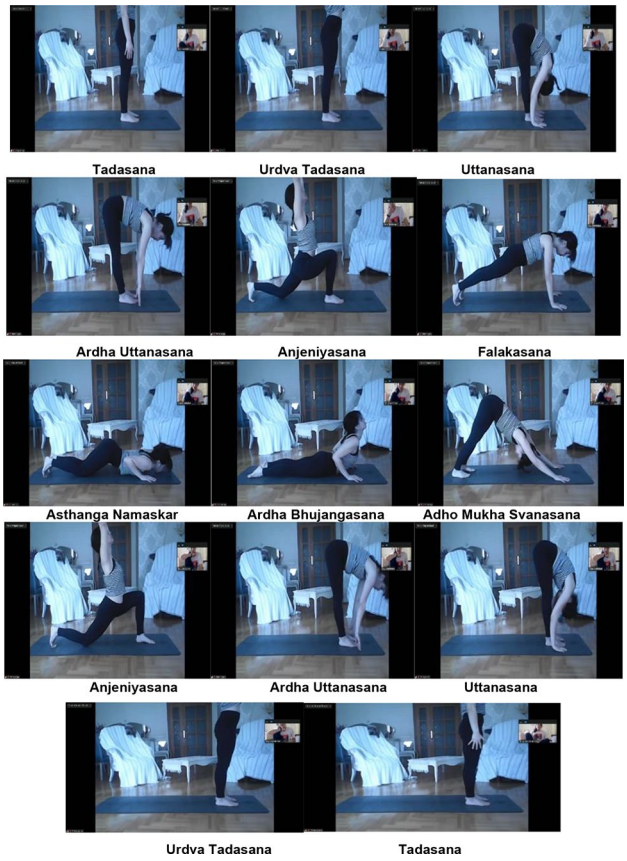

Fig. 2 Hatha suryanamaskar

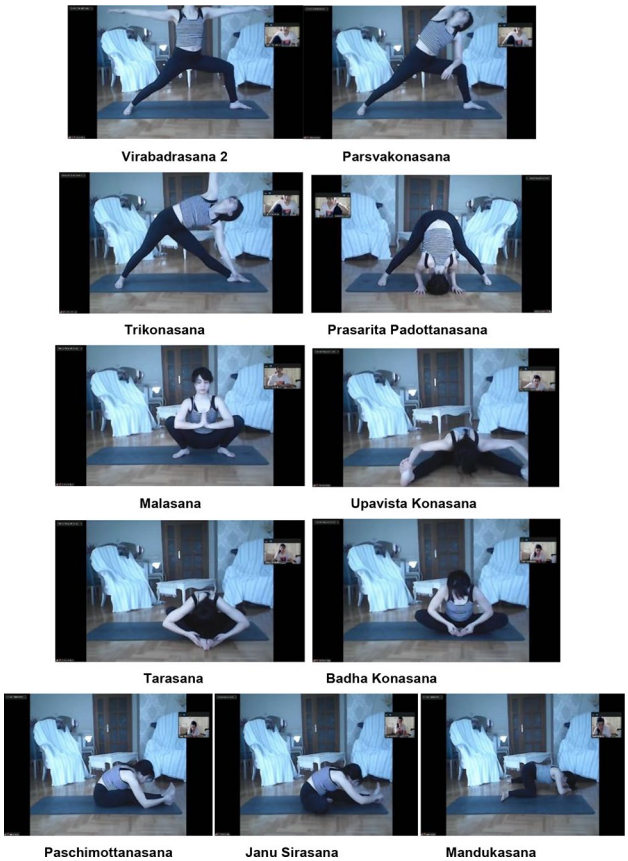

Fig. 3 Basic asanas

of individuals [22]. It is a 5-point Likert type scale that consists of 22 items and three sub-dimensions: "negative effects/somatic complaints," "menstrual pain," and "coping methods." Individuals are asked to give a value between 1 (never) and 5 (always) for the symptoms they experience associated with menstruation. The MSS score is calculated by taking the average of the total score of the scale items. The rising in the mean score indicates an increase in the severity of menstrual symptoms.

Depression level

Beck Depression Scale (BDS) was used to evaluate the depression level of the women participating in the study. It is a self-report scale developed by Beck et al., consisting of 21 questions used to assess the level of depression. Each item scores between 0 and 3. The highest possible score is 63. A high total score indicates a high level or severity of depression [23].

Anxiety level

The State and Trait Anxiety Inventory (STAI) was used to determine the anxiety level of the participants. It is a questionnaire consisting of 40 questions that has been validated and reliable in Turkey [23]. It consists of two subtests, State (STAI-I) and Trait (STAI-II) anxiety, and each subtest has 20 items. The first 20 questions (STAI-I) question the state anxiety, which is the anxiety of the individual at a certain moment, and the second 20 questions (STAI-II) question the trait anxiety, which defines the general anxiety tendency of the individual. If the total scores are below 42 in both sections, it is normal, and if it is above, it indicates high anxiety.

Health-related quality of life (HRQOL)

The trans-cultural adaptation version of the Nottingham Health Profile (NHP) was used to assess the health-related quality of life [24]. The Nottingham Health Profile is a general quality of life questionnaire designed to measure perceived health problems and the extent to which these problems affect normal daily activities [25]. The survey had a total of 38 questions consisting of six sub-sections: lack of energy (3 items), pain (8 items), emotional reaction (9 items), sleep disturbance (5 items), social isolation (5 items), and physical activity (9 items). The questions are answered as "yes" or "no" by the cases; and the best score to be taken in the sub-sections is "0," and the worst score is "100" [26].

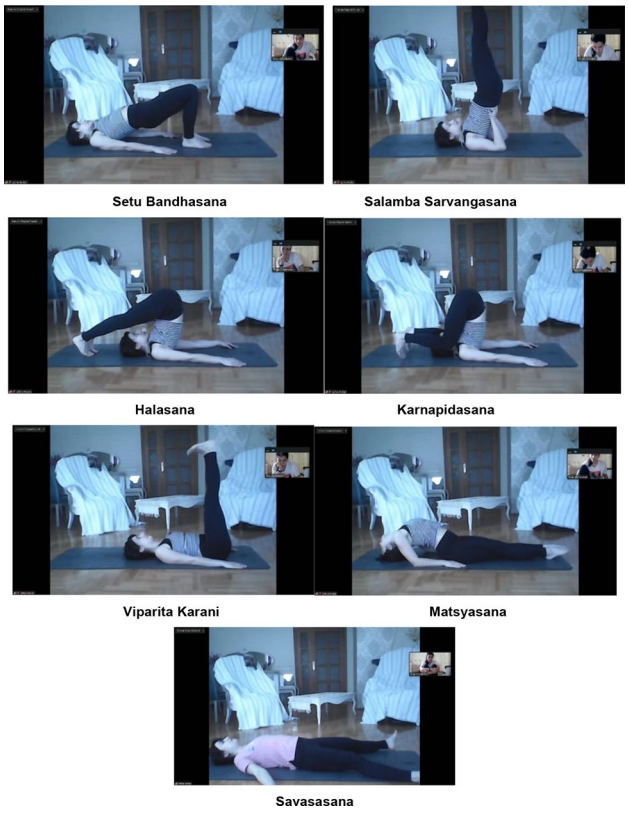

Fig. 4 Closing asanas

Body awareness

Body awareness of the subjects was evaluated with the Turkish validity and reliability of the Body Awareness Questionnaire (BAQ). BAQ is a questionnaire that aims to determine the normal or abnormal sensitivity level of body composition. It consists of four subgroups (attention to changes in body process and responses, sleep–wake cycle, prediction at onset of illness, prediction of body responses) and a total of 18 statements. The participant is asked to rate each statement with numbers from one to seven (1 = not at all true for me, 7 = completely true for me). The rating in the survey is done as a total score. The total score to be obtained from the questionnaire can be at most 126 and at least 18. The higher the total score to be obtained from the survey, it is concluded that body awareness is better [27, 28].

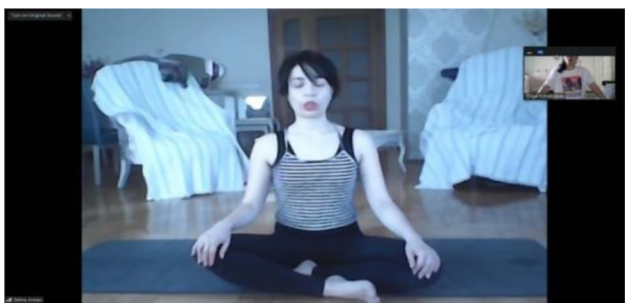

Fig. 5 Sitali breathing exercise

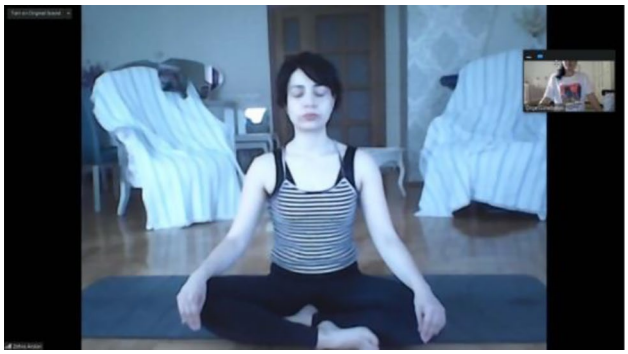

Fig. 6 Ujjayi breathing exercise

Self-esteem

The Rosenberg Self-Esteem Scale was used to assess self-esteem of subjects. The Rosenberg Self-Esteem Scale (RSES) consists of twelve subscales and the first ten items measure self-esteem. The positively and negatively charged items are listed sequentially. Items 1, 2, 4, 6, and 7 are positive, while the items 3, 5, 8, 9, and 10 are negatively loaded. Points of 0 or 1 were scored as high self-esteem, points of 2 to 4 as medium self-esteem, and points of 5 or 6 were recorded as low self-esteem. The lower scores in the scale mean higher self-esteem, while higher scores indicate lower self-esteem. The scale scores range from 0 to 30 points and 30 points are accepted as having a maximum level of self-esteem [29].

Statistical analysis

Statistical analyses were performed using SPSS 22 (IBM Corp. Armonk, NY, USA). Quantitative analysis was reported as means, standard deviations, percentage (%),

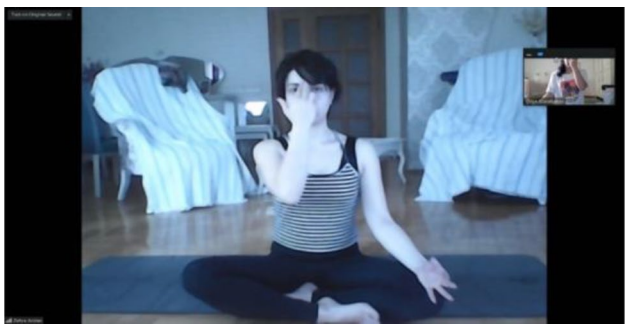

Fig. 7 Nadi Shodhana breathing exercise

median, and change intervals (minimum-maximum). The results of the homogeneity and normality tests were used to decide which statistical methods to use. When the data were normally distributed, comparison was made using paired *t*-tests. For variables that did not meet the parametric test assumptions, comparisons between groups were made using the Mann-Whitney *U*-test and the comparisons between baseline and post-training were performed using the non-parametric Wilcoxon test for each group. According to the results of the sample size analysis made with the primary outcome measure of quality of life, when it was desired to detect a moderate to large difference (effect size) with 5% error and 80% power, it was found appropriate to work with 32 people, at least 16 people in each group. G*Power 3.1.9.2 software program was used for sample size calculation.

Results

Sociodemographic characteristic of subjects

Thirty-four participants were screened and 32 participants fulfilled the selection criteria and randomly assigned to one of the two groups: 16 in the tele-yoga training group and 16 healthy young adult women in the control group. All participants completed the study. Compliance with the exercise intervention was very good; the tele-yoga training group attended an average of 16 of the 16 (100%) sessions. The flowchart in the research process is shown in Fig. 8. The sociodemographic characteristics and clinical profiles of all subjects were examined. There were no baseline differences in the age, height, weight, BMI, regular menstrual day, and menstruation duration between the two groups (Table 1) ($p > 0.05$). The other sociodemographic features of groups are shown in Table 1.

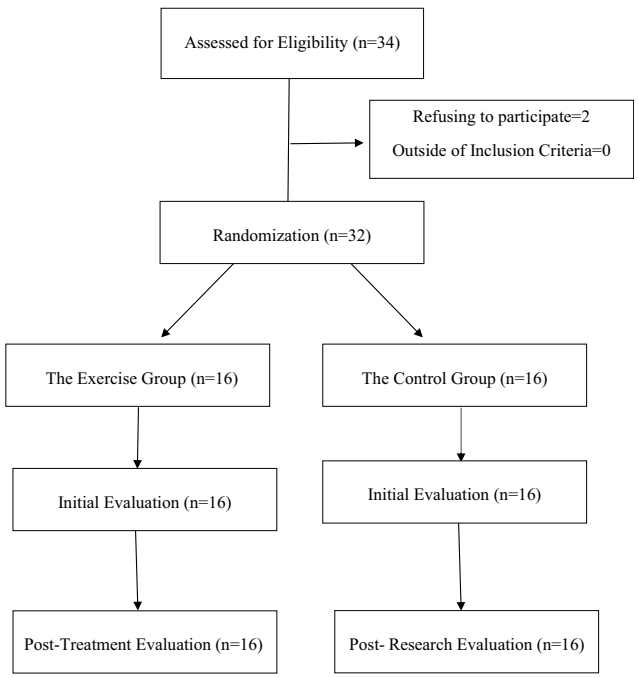

Fig. 8 The flowchart of the study

Outcome measurements

Comparison of baseline outcome measurement of groups

In baseline measurement, the MSS coping methods score ($p = 0.012$) was found to be statistically significant higher in the tele-yoga training group than in the control group ($p < 0.05$). There were no baseline differences in the other outcome measurement values between the tele-yoga training and control groups ($p > 0.05$) (Table 2).

Comparison of pre- and post-outcome measurement of groups

According to the pre-post-training results of the yoga training group, while STAI-I, STAI-II, RSES, BAQ, NHP pain, and physical activity score showed a similar distribution ($p > 0.05$), the scores of all other scale values showed a statistically significant decrease ($p < 0.05$). The statistically significant improvement was found in the sub-dimension values of MSS total ($p = 0.001$), negative effects/somatic complaints ($p = 0.000$), menstrual pain symptoms ($p = 0.003$), coping methods ($p = 0.000$), NSP total ($p = 0.000$), sleep disturbance ($p = 0.021$), energy level ($p = 0.002$), emotional reactions ($p = 0.000$), social isolation ($p = 0.039$), and BDS score ($p = 0.000$) in the tele-yoga group. In the control group, all outcome measures were similar ($p > 0.05$), except for statistically significant worsening in the NHP total score ($p = 0.000$) (Table 2).

Comparison of post-outcome measurement between groups

When the post-outcome measurements of groups were compared after 6 weeks, the tele-yoga training group had MSS negative effects/somatic complaints ($p = 0.001$), total ($p = 0.001$) sub-parameters, NHP pain ($p = 0.004$), energy ($p = 0.000$), emotional reactions ($p = 0.000$), sleep disturbance ($p = 0.004$), social isolation ($p = 0.017$), physical activity ($p = 0.003$), total ($p = 0.000$) sub-dimensions, and BDS ($p = 0.000$) scores were statistically significant lower than the control group ($p < 0.05$). The results of the other outcome measurements were similar in

Table 1 The distribution and comparison of sociodemographic characteristics of the subjects

	Tele-yoga traning group ($n=16$)	Control group ($n=16$)	Z	p^a
Age (years) X ± SD Median (min–max)	25.56 ± 4.55 25.00 (18.00–33.00)	29.81 ± 7.00 30.50 (18.00–43.00)	− 1.906	0.056
Height (cm) X ± SD Median (min–max)	167.00 ± 5.40 169.50 (155.00–175.00)	163.44 ± 6.82 164.50 (150.00–176.00)	− 1.674	0.102
Weight (kg) X ± SD Median (min–max)	61.38 ± 11.12 59.50 (49.00–98.00)	62.94 ± 14.69 65.00 (43.00–98.00)	− 0.774	0.445
BMI (kg/m^2) X ± SD Median (min–max)	21.99 ± 3.65 21.08 (17.71–33.91)	23.47 ± 4.98 22.53 (17.58–34.72)	− 0.829	0.423
Regular menstrual day X ± SD Median (min–max)	29.06 ± 2.49 28.00 (24.00–35.00)	28.56 ± 3.79 28.00 (18.00–35.00)	− 0.412	0.696
Menstruation duration X ± SD Median (min–max)	5.88 ± 1.15 5.50 (4.00–8.00)	5.25 ± 1.34 5.00 (3.00–8.00)	− 1.322	0.224
			x^2	p^b
Working status, *n* (%)			11.780	**0.008**
Being student	6 (37.5)	4 (25.0)		
Not working	-	4 (25.0)		
Working	6 (37.5)	8 (50.0)		
Working part time	4 (25.0)	-		
Education status, *n* (%)			3.823	0.148
High school	6 (37.5)	4 (25.0)		
University	6 (37.5)	11 (68.8)		
Master	4 (25.0)	1 (6.3)		
Marital status, *n* (%)			4.167	**0.019**
Single	15 (93.8)	9 (56.3)		
Married	1 (6.3)	7 (43.8)		
Menstrual pain medication using, *n* (%)			0.368	0.500
No	1 (6.3)	2 (12.5)		
Yes	15 (93.8)	14 (87.5)		
Contraceptive using, *n* (%)			-	1.000
No	15 (93.8)	15 (93.8)		
Yes	1 (6.3)	1 (6.3)		
Gynecology surgical history, *n* (%)			-	1.000
No	15 (93.8)	15 (93.8)		
Yes	1 (6.3)	1 (6.3)		
Cigarettes, *n* (%)			2.926	**0.041**
No	15 (93.8)	10 (62.5)		

[a]Mann-Whitney *U*-test. [b]Chi-square test. *X*, mean; *SD*, standard deviation; *BMI*, body mass index; *cm*, centimeter; *kg*, kilogram; *m*, meter

the post-research yoga training and control groups ($p>0.05$) (Table 2).

Comparison of changes in outcome measurement of groups

In the difference values between groups, there were statistical differences in favor of the tele-yoga training group in MSS negative effects/somatic complaints ($p=0.000$), menstrual pain symptoms ($p=0.003$), coping methods ($p=0.000$), MSS total ($p=0.000$) sub-dimensions, NHP sleep status ($p=0.019$), emotional reactions ($p=0.000$), energy level ($p=0.000$), social isolation ($p=0.004$), total scores ($p=0.000$) sub-dimensions, BDS ($p=0.000$), and BAQ ($p=0.011$) scores. The difference between STAI-I, STAI-II, RSES, NHP pain level, and physical activity scores between groups was not statistically significant ($p>0.05$) (Table 2).

Discussion

It was observed in our study investigating the effects of tele-yoga training in healthy women on menstrual symptoms, quality of life, anxiety-depression level, body awareness, and

Table 2 The menstrual symptoms, quality of life, anxiety-depression level, body awareness, and self-esteem scores between the tele-yoga training and control groups

Measurements	Tele-yoga traning group ($n=16$)			Control group ($n=16$)			p^b	p^c
	Baseline X ± SD Median (min–max)	**6 Weeks** X ± SD Median (min–max)	p^a	**Baseline** X ± SD Median (min–max)	**6 Weeks** X ± SD Median (min–max)	p^a		
Menstrual symptoms								
MSS negative affect/ somatic complaints	42.00 ± 9.64 42.50 (21.00–60.00)	32.38 ± 7.05 32.50 (19.00–46.00)	**0.003**	41.50 ± 7.67 39.00 (34.00–63.00)	41.25 ± 8.27 39.50 (33.00–64.00)	0.897	**0.001**	**0.000**
MSS menstrual pain symptoms	19.63 ± 4.96 19.50 (9.00–29.00)	14.06 ± 4.14 15.00 (6.00–21.00)	**0.003**	18.38 ± 5.00 18.00 (12.00–30.00)	18.50 ± 5.14 17.00 (12.00–30.00)	0.867	0.056	**0.003**
MSS coping methods	9.88 ± 3.24 11.00 (3.00–15.00)	5.88 ± 2.36 6.50 (3.00–10.00)	**0.001**	6.88 ± 3.01 6.50 (3.00–13.00)	7.44 ± 2.73 7.00 (3.00–13.00)	0.515	0.171	**0.000**
MSS total score	71.50 ± 16.25 71.00 (38.00–101.00)	52.31 ± 11.29 53.00 (38.00–76.00)	**0.001**	66.75 ± 13.72 65.00 (51.00–104.00)	67.19 ± 13.49 64.50 (53.00–106.00)	0.926	**0.001**	**0.000**
Quality of life								
NHP pain	7.66 ± 10.68 0.00 (0.00–35.27)	1.28 ± 3.50 0.00 (0.00–10.49)	0.102	14.30 ± 15.30 9.48 (0.00–53.22)	12.34 ± 13.09 8.96 (0.00–46.49)	0.752	**0.004**	0.539
NHP energy	48.05 ± 35.90 48.80 (0.00–100.00)	9.20 ± 16.46 0.00 (0.00–36.80)	**0.002**	63.05 ± 38.14 62.00 (0.00–100.00)	71.60 ± 36.08 100.00 (0.00–100.00)	0.564	**0.000**	**0.000**
NHP emotional reactions	42.34 ± 27.38 37.18 (0.00–95.80)	7.66 ± 10.79 3.54 (0.00–35.31)	**0.000**	38.96 ± 29.58 41.52 (0.00–95.80)	49.48 ± 29.03 44.16 (0.00–95.80)	0.341	**0.000**	**0.000**
NHP sleep disturbance	20.94 ± 24.09 12.57 (0.00–72.74)	4.54 ± 7.31 0.00 (0.00–22.37)	**0.021**	30.82 ± 31.38 29.75 (0.00–100.00)	30.34 ± 29.92 18.90 (0.00–100.00)	0.897	**0.004**	**0.019**
NHP social isolation	26.04 ± 31.97 9.68 (0.00–77.47)	2.42 ± 6.61 0.00 (0.00–19.36)	**0.039**	23.12 ± 33.37 7.99 (0.00–100.00)	32.00 ± 35.46 25.65 (0.00–100.00)	0.515	**0.017**	**0.004**
NHP physical activity	6.81 ± 11.07 0.00 (0.00–31.29)	0.72 ± 2.89 0.00 (0.00–11.54)	0.210	16.17 ± 13.51 16.45 (0.00–32.56)	15.62 ± 14.26 21.36 (0.00–44.10)	0.809	**0.003**	0.323
NHP total score	151.85 ± 89.89 147.62 (0.00–346.01)	25.83 ± 33.65 12.29 (0.00–103.01)	**0.000**	186.42 ± 98.80 181.59 (50.79–357.21)	211.39 ± 96.90 220.12 (36.57–335.20)	**0.000**	**0.000**	**0.000**
Depression level								
BDS	16.63 ± 9.04 15.50 (5.00–35.00)	5.38 ± 4.72 4.00 (1.00–18.00)	**0.000**	16.44 ± 10.13 16.00 (0.00–31.00)	18.56 ± 11.43 16.00 (2.00–36.00)	0.590	**0.000**	**0.000**
Anxiety level								
STAI-I	41.69 ± 5.77 41.00 (34.00–50.00)	43.19 ± 3.97 46.00 (40.00–53.00)	0.052	39.69 ± 4.17 40.50 (32.00–46.00)	41.00 ± 4.72 42.00 (31.00–48.00)	0.381	**0.**051	0.110
STAI-II	49.69 ± 5.88 49.50 (40.00–63.00)	48.19 ± 4.87 49.00 (38.00–59.00)	0.445	49.13 ± 7.43 47.00 (38.00–66.00)	49.19 ± 7.69 46.50 (36.00–67.00)	0.867	0.956	0.239
Body awareness								
BAQ score	86.94 ± 26.26 94.00 (40.00–126.00)	97.00 ± 21.94 100.50 (52.00–122.00)	0.305	89.69 ± 31.27 96.50 (28.00–124.00)	87.63 ± 26.62 92.50 (39.00–122.00)	0.780	0.381	**0.011**
Self-esteem								
RSES score	21.06 ± 7.22 20.00 (10.00–33.00)	20.56 ± 4.93 14.00 (10.00–26.00)	0.652	21.13 ± 6.81 19.50 (12.00–34.00)	21.19 ± 6.73 20.00 (12.00–34.00)	0.956	0.580	**0.370**

$p < 0.05$. Mann–Whitney *U*-test. *X*, mean; *SD*, standard deviation; *MSS*, Menstrual Symptom Scale; *NHP*, Nottingham Health Profile; *BDS*, Beck Depression Scale; *STAI-I*, State and Trait Anxiety Scale-State; *STAI-II*, State and Trait Anxiety Scale-Trait; *BAQ*, Body Awareness Questionnaire; *RSES*, Rosenberg Self-Esteem Scale. p^{α}: Baseline and after 6 weeks in groups difference *p*-values. p^b: last outcome measurement between groups *p*-values. p^c:changes in outcome measurement of groups *p*-values, [a]Wilcoxon test, [b–c]Mann-Whitney *U*-test

self-esteem during the COVID-19 pandemics that tele-yoga training had healing effects on menstrual symptoms, quality of life, body awareness, and depression levels, while it caused no changes in the anxiety status and self-esteem of women.

As a result of our study, while the MSS negative effects, coping methods with menstruation, menstrual pain symptoms, and total scores displayed statistically significant improvement pre- and post-training in the tele-yoga

training group, no improvements were seen in the control group. While there are no studies determining the menstrual symptoms with MSS among the studies examining the effectiveness of yoga training, our results have been compared to studies determining the menstrual symptoms.

There is one study that the effects of yoga on menstrual pain, physical fitness, and quality of life were investigated in young girls with primary dysmenorrhea. In this study, 17 young girls between the ages of 18 and 22 years were instructed to practice yoga for 2 days every week for 12 weeks. It was reported that menstrual pain in young girls practicing yoga improved with statistical significance as compared to the control group who did not practice yoga [30]. In this study, it was concluded that yoga will be an effective method of treatment in women with primary dysmenorrhea. In the meta-analysis studying the effects of yoga on women with primary dysmenorrhea, 4 randomized controlled studies were examined. Yoga sessions lasted for 30 min practiced once a week for 12 weeks in the first study, 120 min practiced 5 times a week for 12 weeks in the second study, 4 times a week for 4 weeks in the third study, and 20 min every week for 2 weeks in the last study [31]. Similarly, with our results, results of all the 4 studies carried out with differing yoga training periods and frequencies indicated yoga as an effective intervention mitigating the menstrual pain. Positions enhancing the functions of hip muscles that could diminish menstrual symptoms were preferred in our study. Yoga positions used in the above mentioned studies were similar to those used in our study.

Considering these studies, although yoga exercise trainings have not been carried out using the TR method, results display parallelism with our yoga exercise program with the menstrual symptom results we have obtained. We consider the tele-yoga approach may be used in menstrual problems since it lacks side effects, is a low-cost and easily accessible method, and is noninvasive.

The standards of living of individuals have been affected in the COVID-19 process in each and every aspect, and individuals state that their living processes have been affected negatively. Healthy quality of life can be ensured by providing for the perception of integrated well-being in the psychosocial, physical, and biological sense in women, who raise the future generations and play a great role in public health, and by improving the existing problems if any. It has been indicated in the literature that yoga, which is a holistic approach, provides multifaceted improvements for the quality of life [32].

While the tele-yoga group in our study showed statistically significant improvements in the sub-parameters of NSP including energy, emotional, sleep, and isolation, no statistically significant improvements were seen in pain and physical activity sub-parameters. We think that mental and meditation practices of Hatha yoga training have influenced our results in this direction. At the same time, we also emphasize that women who had participated in yoga training having low levels of pain and having experienced physical problems in levels next to nothing have also had effects on our results. The reason for the lack of deterioration in the control group's quality of life after the research period is considered to be the overlapping of the 6-week research period with the full lockdown, that is, the full social isolation during the COVID-19 pandemics.

Only one previous study evaluating the practicability and acceptability of clinical yoga and its effectiveness in the opinion of the patient and investigating if these results differed when applied face-to-face or with tele-yoga method was found. In this study, 30 senior soldiers participated in clinical yoga training given through a videoconference program. In this study, development in health status was determined with the special questions determining the effectiveness of the yoga class and the yoga trainer, and 16 questions concerning satisfaction, pain, anxiety-depression, energy status sleep, and emotional status. Results similar to those obtained in our study have been reported for both groups in a positive way. Doing tele-yoga was concluded as acceptable and practicable at the end of the study, and it was reported that attention should be paid to the issues of risk management and individualization of the therapy [33]. In our study, easy forms of these positions were explained to all the women participating in our study with the purpose of avoiding such risks, and individuals selected the position suitable for them. The therapist observed the participants through the therapy administered online, and instantly corrected the wrong poses with verbal warnings. This was done with the purpose of avoiding risks; and no problems were encountered.

Results of Hatha yoga exercising programs practiced with similar frequencies and periods mentioned in the literature support the results of our study concerning the quality of life. In the light of this information, the biopsychosocial well-being provided for women by tele-yoga programs in addition to face-to-face yoga programs without posing a risk shows the difference of our study from others.

Parameters like the fear of disease, changes in lifestyle, and social isolation during the COVID-19 pandemic have had undeniable mental effects on individuals. The lockdown requirements during the process of pandemic have not only resulted in limitations on physical activity but also have caused the diminishing of social participation and resulted in psychological disorders. It has been reported that increasing in COVID-19 cases and deaths affects mental health and increases the levels of anxiety-depression of individuals [34].

While statistically significant improvements were found in depression symptoms after the 6-week tele-yoga training, no changes were seen in the control group in our study. Many studies evidencing the positive effects of face-to-face

yoga were found in the literature review. In a study, 14 medical school students participated in a 16-week yoga program; and it was concluded that yoga could be effective in diminishing the stress and depression and enhancing the general well-being [35]. In another study, the effects of short-term yoga training were investigated on 28 young adults with mild depression signs in the age range of 18–29 years. Participants were divided into two groups as the yoga and control groups. Yoga exercises were practiced for 5 weeks, 1 h per week. The Beck Depression Scale, Anxiety Inventory, and Mental Status Profile were used in this study. Prominent decreases were seen in depression and anxiety symptoms, negative mental status, and fatigue levels of individuals who were included in the yoga group. In this study, it was emphasized that yoga asanas enhanced moods of individuals in a positive way; however, future studies examining the effects of yoga on mood with larger study groups, research methods, and more evaluation scales are needed [36]. In our study, not only the depression level was evaluated but also the effects of yoga training on many parameters of psychosocial state were also examined using different outcome measures. In this regard, we think that our study makes significance contributions to the literature.

Study of Sharma et al., in which the effects of tele-yoga therapy on pain, disability, anxiety, and depression were examined in the COVID-19 period, is one of the few studies in the literature examining the effects of tele-yoga exercises. Total of 18 patients diagnosed with different types of pain participated in yoga therapy with videoconferencing application from home twice a week for 6 weeks. Pain level was evaluated using the visual analog scale with pain-disability index, and anxiety-depression was evaluated using the Patient Anxiety and Depression Scale. Decreases were seen in pain severity and anxiety-depression scores and increases were observed in functionality level. They reported that tele-yoga therapy may be an effective tool to manage chronic pain and related functional and psychological conditions [16].

Considering that majority of existing studies involve face-to-face yoga trainings, we think that the decrease in depression levels of individuals with remote online yoga exercises without directly contacting the patient is the successful outcome of our study. These results have shown that emotions and spiritual peace in yoga sessions can also be provided through online yoga exercises. With these aspects, our study is significant as it is the first randomized controlled study investigating the effects of yoga exercises applied with TR method on depression level in healthy women.

Jasti et al. studied the effectiveness of tele-yoga on stress management in place of traditional yoga classes. Tele-yoga was applied with 54 participants twice a day, 5 days a week and for 4 weeks. The perceived stress scale, yoga performance questionnaire, and to determine the benefits and side effects of yoga, visual analog scale was used. As a result, it was suggested that intervention with tele-yoga can be safe, practicable, and beneficial in the enhancement of individual well-being and decreasing stress [15]. In another previous study, however, effectiveness of Mindful Stress Reduction Program in teleconferencing format was examined in patients with progressive renal disease. This program included long-term mindfulness training programs and yoga positions. While the training group received trainings with teleconference method for 8 weeks with frequencies ranging between 1, 5, and 3 h a week, the control group was contacted by phone and general communication was provided in relation with the disease. Anxiety, depression, sleep quality, fatigue, and quality of life were evaluated. STAI was used to determine the anxiety level. Similarly, with our results, while no differences in anxiety levels were found between the two groups in STAI anxiety levels in the Mindful Stress Reduction Program applied through teleconferencing with yoga content, although on different populations, positive effects were found in the mental sub-parameter of the quality of life [37]. Tekur et al. compared the effects of yoga exercises to the lower back exercises in 80 patients with chronic lower back pain. STAI was used to determine the anxiety level, while BDS was used to determine the depression level. In conclusion, it was reported that the 7-day intense yoga program reduced the pain, worry, anxiety, and depression, and was more effective as compared to the general low back exercises [38]. It was seen in the literature review that effects of yoga exercises applied through TR or face-to-face had conflicting effects on the anxiety status in different populations [37, 38]. In our study, however, we found no effects of yoga exercises on state and trait anxiety status. No changes were seen also in the control group. It was found that the mean trait anxiety level of the cases in the pre-study period was higher as compared to the state anxiety level. We consider that our results are connected with the facts that anxiety status is a psychological concept that can change instantaneously within the process, and the fears of disease and death and the coincidence of the study period with the full lockdown period. In this period, existence of worries related to future in our population consisting of young and healthy women is also an important factor affecting the level of anxiety concerning the future. We think that long-term and more comprehensive randomized controlled studies on larger case groups are required.

Body awareness is the perception of the individual about his/her body based on biological, psychological, physical, societal, and cultural factors. It is known that the COVID-19 process had resulted in important changes on these factors. Although it can be considered that the individual can turn to his/her inner-self and become aware of his/her body more intensely with the intention of controlling the signs of the disease, the high levels of stress experienced throughout the pandemic period can suppress bodily and mental perception [39].

BAQ was used in a previous study carried out to investigate if Hatha yoga practices increased body awareness or not. The results of this study have shown that the Hatha yoga training group having exercises for 1 h two times a week for 3 months had better body awareness as compared to the control group [40]. In the study conducted by Daubenmier et al., body awareness in 3 groups having yoga exercises for 1.5 h, having aerobic exercises including step exercises for 30 min, and having no yoga or aerobic exercises or any other exercises were compared with each other. Results of the study have shown that body awareness in individuals having yoga exercises were significantly higher as compared to the other groups [41].

In our study, while the mean BAQ score in the yoga training group was 86.94, it was 89.69 in the control group. These values were indicating body awareness of medium level. An increase was found in the body awareness of the yoga training group; however, this increase was not statistically significant. In the difference analysis between the two groups, development was found in body awareness favoring the tele-yoga group. While it is possible that the reason for these results can be related to difficulties of participants in perceiving the body awareness because the training was given online, it can also be related to the overlapping of our study with a more stressed period of full lockdown. When it is considered that the yoga training periods in the studies given above are longer than in our study, yoga exercises with longer periods can result in positive results on body awareness [40, 41]. Studies in sufficient numbers investigating the effects of yoga exercises including the face-to-face yoga exercises on body awareness could not be found in the literature review. We think that even if our study results in the yoga training group are not statistically significant, they can make a contribution to the literature because they are superior to the control group, and it can lead the way to the continuity of tele-yoga trainings for applications.

Self-esteem means the acceptance of the self by the individual as may differ under certain conditions and times, and the value attached to the self by the individual [42]. Influences on the self-esteem of the individual during the COVID-19 pandemic process with heavy psychological loads are indicated as an expected result [43]. The effect of yoga practices on the self-esteem is a result of harmonious operation of each and every system of the body like a kinetic chain, and ensuring body, mind, and mental integrity of the individual by releasing the individual from contradictory conditions [3, 4]. Yoga exercises, which make adaptation to positive or negative changes in life, can play a vital role when its effects on self-esteem are united with its other effects.

There are studies in the literature showing that yoga programs increase the self-esteem [44–46]. Although there are a few studies examining the effects of tele-yoga on psychosocial status and stress level [17], there are no studies evaluating the self-esteem. Results obtained in our study are the first and pioneer tele-yoga programs.

Taşpınar et al. investigated the effects of Hatha yoga and resistance exercises on mental health and well-being in sedentary adults. Fifty-one participants were divided into 3 groups as the Hatha yoga group, resistant exercise group, and the control group. Hatha yoga group and the resistant exercise group were taken to exercise training 3 days a week for 7 weeks. The control group was not taken to any program. In the study, Rosenberg Self-Esteem Scale, Beck Depression Inventory, Body Investment Scale, Nottingham Health Profile, and Visual Analog Scale were used. Significant improvements were observed on all the outcome measures in the Hatha yoga and resistant exercise groups, while no improvement was seen in the control group. While Hatha yoga provided better improvements in the dimensions of fatigue, self-esteem, and quality of life, it was concluded that resistant exercise training provided better improvements in body image. Hatha yoga and resistant exercises reduced the depression symptoms to similar levels. Although BDS and NHP questionnaire results showed parallelism with our results, there are no similarities with our RSES questionnaire results [46]. In our study, the mean RSES score of the yoga training group was 21.06, and the mean RSES score of the control group was 21.13. Considering that the best RSES score is 30, these values indicate good levels of self-esteem. No significant improvement was observed after the yoga training, and no significant differences appeared from the control group. We think that this arises from the high levels of self-esteem in healthy young women before the study period and from the pandemic conditions. In this context, we concluded that long-term yoga training might make positive contributions to the self-esteem in our study group.

Limitations

Although our study was implemented selflessly by an experienced physiotherapist with yoga training, lack of long-term follow-up is an important limitation. It can be possible to observe the changes in the results of our study that are inconsistent with the literature, and although the positive effects on menstrual symptoms have been proven, a study period covering more than one menstrual cycle can enhance the quality of results.

Conclusion

It is the only study in the literature evaluating the menstrual symptoms, quality of life, anxiety-depression, body awareness, and self-esteem in healthy women during tele-yoga training. At the same time, presence of a control

group in our study, randomized controlled design, and lack of any side effects in any of the participants attributable to the training are other strong sides. Although positive effects of yoga trainings in healthy women have been shown in the literature, no studies concerning the tele-yoga exercises, of which the use and necessity have increased because of COVID-19, have been found. With these reasons, we think that our study will lead the way for healthcare professional working in this area in addition to its contributions to the literature.

In the light of these results, it is thought that tele-yoga trainings may be a safe and effective method in reducing menstrual symptoms and depression and increasing the quality of life and body awareness in healthy women. We also believe that all these effects should be examined in future studies with greater numbers of cases and in different populations.

Declarations

Ethics approval The ethics approval of the Medical and Health Sciences Research Board was included (Meeting date: 07.04.2021, Ethics committee no: KA21/158) with the 1964 Helsinki declaration and comparable ethical standards.

Conflict of interest The authors declare no competing interests.

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