

Yoga Improves Anxiety and Vital Signs of Women with Premenstrual Syndrome

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ABSTRACT

Objective: To study the effects of yoga on anxiety and vital signs in women that at the same time suffer from premenstrual syndrome (PMS).

Material and Methods: In this randomized controlled clinical trial, yoga administered to subjects with PMS for ten weeks in three sessions with a duration of 60 minutes. Women in the control group did not do any yoga. The demographic questionnaire was filled in by subjects before the intervention. Subjects were also expressed their experiences by filling the Hamilton anxiety rating scale twice, before and after the intervention. Sixty-two subjects were entered into the study equally divided into yoga and control groups, randomly.

Results: The symptoms of anxiety including anxious mood, tension, fears, insomnia, intellectual, depressed mood, somatic (muscular), somatic (sensory), cardiovascular symptoms, respiratory symptoms, autonomic symptoms were significantly improved in the yoga group after intervention compared to the control group ($P < 0.05$), except gastrointestinal symptoms, genitourinary symptoms, and behavior at the interview, based on Mann-Whitney Test. Vital signs did not change after yoga exercises except diastolic pressure which was regulated ($P < 0.05$).

Conclusions: Yoga significantly affected the anxiety and condition of women with PMS concluding applicability of yoga for women with PMS to pass menstrual cycles with less anxiety.

Keywords: Yoga; Anxiety; Vital Signs; Women; Premenstrual Syndrome

INTRODUCTION

Yoga exercises are known to affect the body with physical, breathing and mental movements involving mind, body, emotions, logic, and attention [1]. It has been described that yoga acts through the regulation of hypothalamic-pituitary-adrenal axis negatively intermediated by the sympathetic nervous system (SNS). Yoga has also shown to be effectively regulating the secretions of cortisol, glucose, plasma renin, epinephrine and norepinephrine in the bloodstream to monitor vagal nerves, which are responsible for body activity [2]. Additionally, yoga has shown to reduce the negative effects of stress on the immune system through positive moderation of immunoglobulin A levels [3].

Women with premenstrual syndrome (PMS) suffer a bunch of symptoms during their menstrual cycle every month, specifically in the luteal phase. These symptoms are emotional (EM), physical

(PHY) and behavioral (BE) which make women uncomfortable during their reproductive age. Numerous studies have confirmed that yoga positively affects the symptoms of PMS in women during their menstrual cycle [4-7]. Therefore, we investigated the effects of yoga on anxiety symptoms in association with vital signs in women at their premenstrual period.

MATERIALS AND METHODS

Briefly, a list of gynecology clinics was handed over from Governmental Treatment Organization in Tabriz, Iran. Then 20 clinics through the random numbers table were chosen. After screening patients with Premenstrual Symptoms Screening Tool (PSST) questionnaire, 150 women having PMS were listed. Thereafter, 150 women monitored for eligible and exclusion criteria. The eligible criteria were included in: women should be

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within 20-45 years old, should have regular menstrual cycle, not to be consumer of alcohol at least for three months, not to be consumer of chemical or herbal medications and contraceptives, not to be depressed, not to have reproductive tract diseases, not to be cigarettes or caffeine consumer, not to be tobacco or illicit drugs consumers, to be healthy with no joint diseases and rheumatoid arthritis or surgeries that could interfere with yoga exercises and finally to have a willingness to participate in the study. Subjects were excluded if they did not have the willingness to be part of the study, were become pregnant during the study and had experiences in exercising yoga. Finally, after reviewing their recorded medical history researcher was requested from 62 women with PMS to sign the informed consent for experimentation then subjects were entered to the study and were randomly and equally divided into two yoga and control groups. A demographic questionnaire was also filled by subjects before the intervention.

In the present study, the number of subjects was calculated by considering 95% interval confidence and 80% power for 26 subjects per group [6]. A 20% dropout was considered which 31 subjects per group were considered. The allocation was randomly done for yoga and control groups in the form of four and six blocks. To make the allocation blindness, opaque envelopes containing the names of groups labeled with numbers were used. The envelopes were prepared by the non-involved researcher. The first subject received the first envelope. Before allocation researcher or subjects were not aware of allocation results. The researcher and analyzer were unaware as well until the end of the study (Figure 1).

A skilled coach from the Federation of East Azerbaijan, Iran with a valid certification in yoga was worked with yoga group. Yoga movements were extracted from the descriptions of Telong et al. [8] and Long et al. [9,10]. The first two weeks of yoga was considered for physiological adaptations.

In the present study, the Hamilton anxiety rating scale (HARS) for monitoring of the anxiety symptoms was used [11]. This widely used, and the well-validated questionnaire has 14 questions related to the anxiety. This questionnaire was filled by interviewer by asking the questions from subjects. The questions in the HARS questionnaire were about anxious mood, tension, fears, insomnia, intellectual, depressed mood, somatic (muscular), somatic (sensory), cardiovascular symptoms, respiratory symptoms, gastrointestinal symptoms, genitourinary symptoms, autonomic symptoms and behavior at the time of interview. Each question has independently a five-point ratio scale, which is from zero to four implying to the miss of the anxiety signs, mild, moderate, severe and very severe, respectively. The reliability of 0.81 is reported for the HARS questionnaire in the Iranian population.

Researchers were following up by phone calls about possible consuming of medications and filling out the HARS questionnaire. The first call was 30 days after admission to the study and the second call was after completing the yoga intervention.

Statistical analysis was carried out using IBM SPSS statistic for windows, version 23.0 (IBM Corp. Armonk, NY, USA). Normality of data collected from HARS questionnaire for both yoga and control groups before and after intervention were evaluated by K-S and the Shapiro-Wilk test statistical test and confirmed. The data collected from variables are summarized in frequencies and percentages, where quantitative variables are summarized with

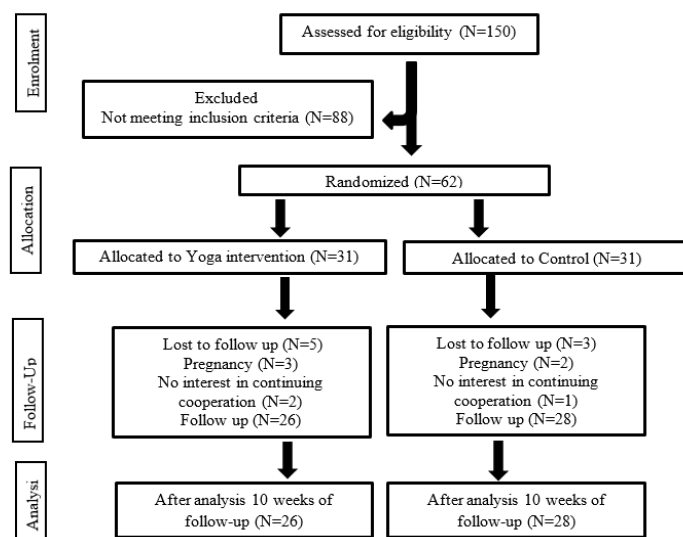


Figure 1: Flow diagram of the progress through the phases of a parallel randomized trial of Yoga and Control groups (that is, enrolment, intervention allocation, follow-up, and data analysis).

Mean \pm SD. The independent student T-test was used to compare the differences of control and yoga groups independently before and after the intervention. The paired t-test is used for within-group comparisons. The ANCOVA was used for comparison of total scores of the anxiety of control and yoga groups before and after the intervention. Mann-Whitney test was used for comparing yoga and control groups before and after the intervention. Wilcoxon Signed Ranks Test was used to compare each group before and after the intervention.

RESULTS

During the trial, some of the subjects were excluded from the study due to being pregnant (three in yoga and two in control groups) or were not have the willingness to continue being in the study (two in yoga and one in control groups) (Figure 1).

Comparisons of the demographic characteristics of subjects in each group are provided in Table 1. Job statement was significantly different for yoga and control groups ($P < 0.033$) whereas marital status, the number of children, education statement and body mass index (BMI) were not. The Mean \pm SD for age, for both yoga and control groups, were 34.4 ± 5.3 and 30.1 ± 6.2 , respectively (Table 1). Both groups had similar means in terms of demographic characteristics, except employment status and age (Table 1).

The total score for control and yoga groups before intervention with ANCOVA was not different whereas yoga group had a significant change after the intervention ($P < 0.004$, Table 2). Furthermore, the total score with T-test paired samples for the control group was not significant whereas for yoga was changed significantly ($P < 0.008$, Table 2).

Before intervention there was no difference with Mann-Whitney test in any of the 14 questions while after intervention anxious mood, Tension, Fears, Insomnia, Depressed mood, Somatic (muscular), Somatic (sensory), cardiovascular symptoms, Respiratory symptoms, Intellectual, Autonomic symptoms, were changed significantly ($P < 0.05$, Table 3), whereas Intellectual, gastrointestinal symptoms, genitourinary symptoms, and behavior at the interview were not statistically changed. With Wilcoxon Signed Ranks Test,

Table 1: This table shows the demographic information of the subjects in both yoga and control groups.

Variables		Control n (%)	Yoga n (%)	P-value*
Job statement	Housekeeper	4 (14.3)	11 (42.3)	0.033
	Practitioner	24 (85.7)	15 (57.7)	
Marital status	Single	11 (39.3)	12 (46.2)	0.574
	Married	15 (53.6)	14 (53.8)	
	Divorced	2 (7.1)	0 (0)	
Number of children	0	16 (57.1)	15 (57.7)	0.642
	1	9 (32.1)	6 (23.1)	
	2	3 (10.7)	5 (19.2)	
Education statement	Diploma	5 (17.9)	3 (11.5)	0.473
	Associate degree	3 (10.7)	1 (3.8)	
	Bachelor's degree	18 (64.3)	17 (65.4)	
	Master's degree	2 (7.1)	5 (19.2)	
BMI	≤ 25	20 (74.1)	15 (57.7)	0.399
	25.1-30	5 (18.5)	9 (34.6)	
	<30.1	2 (7.4)	2 (7.7)	
Variables		Control (Mean ± SD)	Yoga (Mean ± SD)	P-value**
Reproductive status	Age of first period (years)	13.357 ± 1.747	13.115 ± 1.306	0.57
	Age (years)	30.179 ± 6.290	34.462 ± 5.368	0.01
	Period time (days)	28.821 ± 2.539	29.923 ± 2.799	0.135
	Period duration (days)	6.214 ± 1.371	6.692 ± 2.074	0.319

* P-value was obtained from Chi-Square Tests

**P-value based on Independent T-test

BMI: Body Mass Index

Table 2: The total score provided from the Hamilton anxiety rating scale (HARS) questionnaire, before and after the intervention was calculated for the control and yoga groups.

Groups	Before intervention	After intervention	P-value**
	(Mean ± SD)	(Mean ± SD)	
Control n=28	18.73 ± 15.016	19.19 ± 10.111	0.073
Yoga n=26	16.42 ± 10.278	9.92 ± 7.101	0.008
P-value*	0.907	0.004	-

Pvalue* ANCOVA

P-value** T-test paired samples

Table 3: Hamilton Anxiety Rating Scale (HARS) questionnaire with 14 questions was filled by interviewer questioning of subjects before and after the intervention.

Variables	Groups	Before intervention	After intervention	P-value**
		Average (SEM)	Average (SEM)	
Anxious mood	Control	1.64 (0.201)	1.63 (0.227)	1
	Yoga	1.35 (0.235)	0.92 (0.135)	0.121
	P-value*	0.225	0.019	~
Tension	Control	1.57 (0.149)	1.81 (0.207)	0.185
	Yoga	1.54 (0.216)	1.65 (0.836)	0.021
	P-value*	0.971	0.002	~
Fears	Control	1.04 (0.0174)	1.37 (0.428)	1
	Yoga	0.77 (0.202)	0.27 (0.89)	0.027
	P-value*	0.185	0.003	~
Insomnia	Control	2.64 (1.141)	1.48 (0.216)	0.591
	Yoga	1.32 (0.214)	0.38 (0.097)	0.002
	P-value*	0.298	<0.001	~
Intellectual	Control	1.22 (0.222)	1.37 (0.201)	0.317
	Yoga	1.62 (0.255)	0.92 (0.175)	0.01
	P-value*	0.21	0.094	~

Depressed mood	Control	3.25 (1.520)	1.85 (0.395)	0.299
	Yoga	1.80 (0.231)	0.65 (0.169)	0.001
	P-value*	0.768	0.001	~
Somatic (muscular)	Control	1.14 (0.204)	1.63 (0.424)	0.488
	Yoga	0.81 (0.192)	0.50 (0.169)	0.088
	P-value*	0.209	0.004	~
Somatic (sensory)	Control	0.93 (0.178)	1.19 (0.233)	0.41
	Yoga	0.69 (0.190)	0.46 (0.127)	0.237
	P-value*	0.285	0.028	~
Cardiovascular symptoms	Control	0.56 (0.134)	0.74 (0.165)	0.32
	Yoga	0.58 (0.209)	0.27 (0.089)	0.218
	P-value*	0.558	0.023	~
Respiratory symptoms	Control	0.96 (0.141)	0.89 (0.163)	0.646
	Yoga	0.88 (0.231)	0.38 (0.112)	0.021
	P-value*	0.325	0.016	~
Gastrointestinal symptoms	Control	1.07 (0.213)	1.23 (0.217)	0.634
	Yoga	1.19 (0.208)	0.76 (0.166)	0.007
	P-value*	0.508	0.119	~
Genitourinary symptoms	Control	1.32 (0.230)	1.33 (0.272)	0.942
	Yoga	1.46 (0.249)	0.77 (0.202)	0.006
	P-value*	0.673	0.183	~
Autonomic symptoms	Control	0.82 (0.171)	1.48 (0.222)	0.004
	Yoga	0.85 (0.205)	0.73 (0.189)	0.509
	P-value*	0.867	0.011	~
Behavior at interview	Control	0.82 (0.137)	1.15 (0.231)	0.106
	Yoga	0.96 (0.171)	0.68 (0.125)	0.109
	P-value*	0.616	0.178	~

P-value* Mann-Whitney Test; P-value** Wilcoxon Signed Ranks Test.

autonomic symptoms were negatively affected whereas there was no different in other questions; however, anxious mood, tension, fears, insomnia, intellectual, depressed mood, somatic (muscular), somatic (sensory), cardiovascular symptoms, respiratory symptoms, gastrointestinal symptoms, genitourinary symptoms, autonomic symptoms and behavior at interview were different in control group compare to the yoga group ($P < 0.05$, Table 3).

DISCUSSION

Yoga exercises improved the comfort of women with PMS by affecting anxiety scores negatively with no effect on vital signs. Women's body during menstrual cycle tolerates hormone fluctuations which cause emotional, physical and behavioral symptoms. Premenstrual anxiety makes women discomfort [12] by changing the level of the cortisol which increases its amount makes the managing of the anxious difficult [13]. Fear from PMS symptoms increases the severity of the anxiety [14]. The present study showed that yoga exercises can decrease the symptoms of anxiety such as anxious mood, tension, fears, insomnia, depressed mood, somatic (muscular), somatic (sensory), cardiovascular and respiratory symptoms, intellectual and autonomic symptoms; whereas intellectual, gastrointestinal and genitourinary symptoms besides behavior did not change. Additionally, vital signs such as systolic blood pressure, BMI and heartbeats were not affected by yoga exercises, albeit diastolic blood pressure was significantly decreased. Importantly, the heartbeat was also normal alongside the body mass index. In contrast with the present study, other

studies have shown that yoga affects blood pressure and importantly decreases hypertension in patients with heart problems [15]. Similarly, yoga was used in postoperative breast cancer patients suffering from an anxiety disorder which yoga was also decreased anxiety scores [16].

The mechanism of the effects of yoga on anxiety is unknown however, there are some explanations such as triggering of neurotransmitters by meditation practices such as yoga that moderate psychological disorders [17]. Recent studies have described that the brain probably is involved in the diagnosing and modulating of negative emotional incitements besides the inspiration of cognitive, behavioral, or somatic responses to these incitements [18]. Moreover, a set of limbic activities have shown to be important in controlling of negative emotional incitements specifically the amygdala, a nucleus located in the median temporal lobes seems to play a critical role as well [19]. It has been shown that bilateral lesions of the amygdala are correlated with problems diagnosing facial expressions of fear and negative emotions. On the other hand, electrical stimulation of amygdala has shown to produce fear of feelings and anxiety [20]. Recently, researchers have found that there is a negative relationship between γ -aminobutyric acid (GABA) activity on amygdala and anxiety by making GABA receptors malfunction. When the level of GABA or GABA-receptors were decreased, the level of the anxiety was increased [20]. Serotonin, norepinephrine, and dopamine are neurotransmitters that have a powerful role in the production of anxiety. Studies have shown that patients with panic disorders have lower serotonin

while suffering fear and depression. This association is found by monitoring midbrain raphe and regions of anterior and posterior cingulate [21]. On the other hand, patients practicing meditations have a higher level of serotonin which helps to decrease anxiety [22]. Additionally, norepinephrine has also been shown to decrease the level of anxiety [23]. Research on Tibetan Buddhist meditators using positron emission tomography has shown that they had a huge regional cerebral blood flow in the prefrontal cortex which enhancement in this cortex promotes the reticular nucleus of the thalamus, in turn, produces GABA. It seems the level of GABA, with a critical role in anxiety modulation, can be managed by yoga practices as yoga increases the level of GABA respective factors [17].

CONCLUSION

Yoga decreased the anxiety scores in women with PMS without affecting vital signs. Therefore, yoga has potentials to be prescribed for managing anxiety in women with PMS during their menstrual cycle. Importantly, yoga did not affect the vital signs which highlighted the safety of the yoga for women with PMS.

LIMITATIONS

All the participant's responses in the current study considered, to be honest, and right. Detection of the accuracy and untruth of the responses collected from participants were beyond the researcher's capacity.

SUGGESTIONS

The present study showed that yoga has benefits but there is little information in different aspects and explanations of the mechanism. Therefore, in the future, the mechanism of the effects must be considered for completing the information.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

ETHICAL APPROVAL

This study was approved by the ethics committee of the Medical Science University of Tabriz (Approval 93184).

CLINICAL TRIAL REGISTRY AND REGISTRATION NUMBER

This study was submitted in Iranian Registry of Clinical Trials (IRCT, IRCT201501216582N9).

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