THE JOURNAL OF ALTERNATIVE AND COMPLEMENTARY MEDICINE
Volume 19, Number 12, 2013, pp. 925–929

DOI: 10.1089/acm.2010.0676

Original Articles

Impact of Yoga *Nidra* on Menstrual Abnormalities in Females of Reproductive Age

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Abstract

Objectives: The aim of this study was to observe the effect of Yoga *Nidra* practice on hormone levels in patients who had menstrual irregularities.
Design: The study was a randomized controlled trial.
Settings/location: The study was conducted in the Department of Obstetrics and Gynecology at Chhatrapati Sahuji Maharaj Medical University, Uttar Pradesh, Lucknow, India. Subjects were divided randomly into 2 groups—an intervention and a control group, with 75 subjects in each group. Of these subjects, 126 completed the study protocol.
Subjects: This study involved 150 subjects with menstrual irregularities; 126 of whom completed the protocol.
Interventions: The intervention was the practice of Yoga *Nidra*. The yogic intervention duration was 35–40 minutes/day, five times/week for 6 months. An estimation of hormonal profile was done for both groups at baseline and after 6 months.
Results: Thyroid-stimulating hormone ($p < 0.002$), follicle-stimulating hormone ($p < 0.02$), luteinizing hormone ($p < 0.001$), and prolactin ($p < 0.02$) were decreased significantly in the intervention group, compared with the control group.
Conclusions: The present study demonstrated the efficacy of Yoga *Nidra* on hormone profiles in patients with menstrual irregularities. Yoga *Nidra* practice was helpful in patients with hormone imbalances, such as dysmenorrhea, oligomenorrhea, menorrhagia, metrorrhagia, and hypomenorrhea.

Introduction

There is growing evidence that yoga may be a safe and cost-effective intervention for treating menstrual problems. Women use conventional health care services more frequently than men; thus, it is not surprising that women account for approximately two thirds of health care appointments for complementary and alternative therapies.[1] Yogic techniques are known to improve one's overall performance and work capacity. Following the study of Bhattacharya and Krishnaswami,[2] which showed that yoga exercises do not produce marked effects on physical and physiologic performance, there have been several reports on the beneficial effects of yoga training on physiologic functions.

Women normally have regular and persistent patterns of menstrual-cycle length, with little variation for each woman.[3] However, nearly every woman will experience at least one or more menstrual disorders in her lifetime, with the most common disorder being amenorrhea.[4] Patient's age is one of the recognized risk factors for menstrual disorders identified in the study reported in this article. The older patients are, the more likely it is for them to develop menstrual disorders.[5] The variability of different women's normal menstrual cycles in length, duration of phases, and levels of reproductive hormones is well-documented.[6–15] Dysmenorrhea, or menstrual pain, is defined as chronic pelvic pain that occurs in ~15%–70% of young women.[16–17] Wood et al.[18] found that dysmenorrhea is most common between the ages of 15 and 19, and that 82% of the women in this age group experience such pain. This pain gradually increases from the age of 15 and then begins to decline by the age of 20 and following parity.[19,20] There are two types of dysmenorrhea:

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(1) primary and (2) secondary dysmenorrhea. Primary dysmenorrhea is related to myometrial contractions induced by prostaglandins (Pgs) originating in secretory endometrium, which result in uterine ischemia and pain.[21,22] In addition to the physiologic perspective, various psychologic theories have also been proposed, emphasizing the role of personality factors and attitudes about menstruation.[23] Koff and Rierdan[24] found that negative attitudes about menstruation are associated with dysmenorrhea. It has also been found that, over the long term, yoga has decreased thyroid-stimulating hormone (TSH), growth hormone, and prolactin levels significantly.[25,26]

Materials and Methods

Participants

Subjects with menstrual irregularities visiting the Department of Gynecology, at Chhatrapati Sahuji Maharaj Medical University, Uttar Pradesh, Lucknow, India, were included in the study. A senior gynecologist referred the patients after they were examined to check their physical health and medication status. Approximately similar medications (tranexemic acid, ethamsylate, madroxy progesterone, norethisterone ethinyl estradiol, or Levonorgestrel) was provided to both groups. The institutional research ethics committee approved this study.

Study design

Each subject was randomly assigned to one of the two groups—(1) conventional medication + yoga *Nidra* or (2) conventional medication only—using a random number-generator so that equal numbers of subjects were recruited into each group. A professional who was not associated with this study generated the randomization scheme with a block of size 4 for up to 196 patients. These numbers were pasted on identical opaque envelopes containing information on the intervention and control groups. The numbers were noted for group 1 (the intervention group) and group 2 (the control group) and sealed in a larger envelope. After randomization, there were 75 patients in each group.

The patients who were included in the study were diagnosed with menstrual disorders according to the following diagnostic criteria after taking a detailed clinical history from each patient: pathological amenorrhea; dysmenorrhea; oligomenorrhea; polymenorrhea; menorrhagia; metrorrhagia; and hypomenorrhea. Women having known gynecologic neoplastic diseases requiring surgery or pelvic inflammatory disease (PID), or who were pregnant were excluded from the study. Subjects who did not participate in yogic intervention classes (>80%Yoga *Nidra* classes) were also excluded from the study. During the study the control group did not practice Yoga *Nidra*. Patients were strictly asked not to get involved in any type of yogic practices.

Assessments

After signed informed consent by the subjects, anthropometric measurements were taken. Height was measured with the participants standing without shoes and was recorded to the nearest 0.5 cm. Weight was measured using a digital scale, with the participants wearing light clothing, and was recorded to the nearest 100 g.

Five milliliters (5 mL) of peripheral fasting blood was collected during the second and third days of the menstrual cycle (follicular phase) from all of the subjects before the study for baseline assessements, and all of these assessments were repeated after 6 months of the intervention. For estimation of hormonal profiles, serum was separated by a centrifuge machine (3500–4000 rotations/minute) at room temperature after 1 hour. Laboratory tests were performed in the department of pathology.

Most of the participants were drawn from the from local population.

Before the study, all subjects were asked to maintain their routine activities and not initiate any new physical activities for the duration of the study. Patients, who dropped out from the study did not differ significantly in terms of age.

Interventions

Under the guidance and supervision of yoga experts and faculty members, subjects performed Yoga *Nidra*. Yoga *Nidra* is performed in *Shavashana*. It has several steps such as: Resolve; Rotation of consciousness; Awareness of the breath; Feeling and sensation; Visualization; and Ending the practice with resolve.[27] Yoga *Nidra* practice was done in the department of physiology. These sessions were free of cost, and all the necessary facilities were provided to the participants, such as an airy room, yoga mats, etc. Subjects were regularly motivated to continue the Yoga *Nidra* practice. The total duration of this practice was 35–40 minutes/day, 5 days per week in the morning for 6 months.

Data extraction and analysis

Statistical analysis was done to analyze differences in scores pre and post intervention.[28,29]

• Differences in pretreatment and post-treatment values for hormonal variables were obtained. The scores for the two

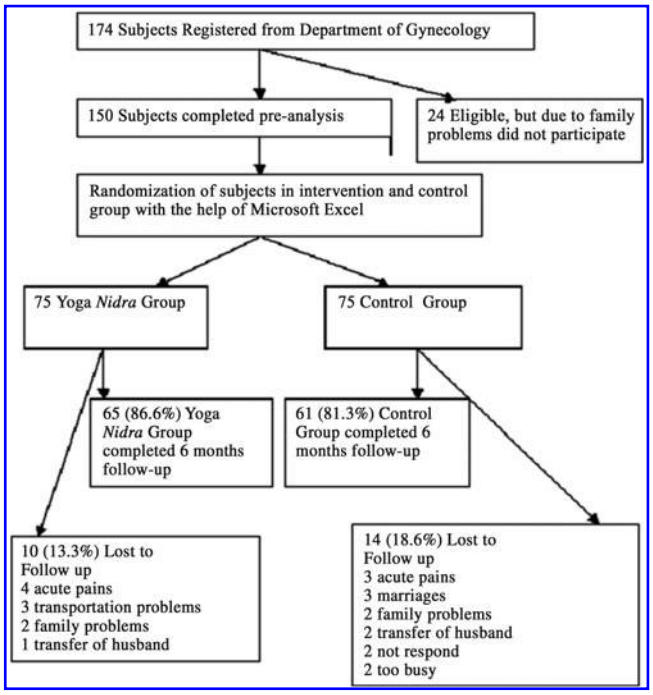

FIG. 1. Flowchart of the study.

Table 1. Baseline Demographic Profile of 150 Patients in Intervention and Control Groups

Variables	*Total subjects (N = 150)*	*Intervention group (n = 75)*	*Control group (n = 75)*
Age (years)	28.08 ± 7.43	28.53 ± 7.07	27.62 ± 7.78
Height (meters)	154.48 ± 5.30	155.30 ± 4.92	153.66 ± 5.56
Weight (kg)	53.98 ± 11.44	56.01 ± 12.13	51.95 ± 10.40
BMI (kg/m^2)	22.59 ± 4.59	23.21 ± 4.88	21.98 ± 4.22
WC (cm)	76.48 ± 12.99	77.36 ± 13.10	75.61 ± 12.92
HC (cm)	92.32 ± 12.22	94.52 ± 12.19	90.12 ± 11.93
WHR	0.83 ± 0.07	0.81 ± 0.06	0.83 ± 0.07

Values are represented as mean ± standard deviation.
BMI, body mass index; WC, waist circumference; HC, hip circumference; WHR, waist–hip ratio.

groups were compared, using an independent Student's *t*-test. A *p*-value of < 0.05 was considered to be significant. InStat3 software, version 3.05, was used for the analysis.

One hundred and seventy four (174) women attended the prescreening visit, but 24 did not end up participating because they were experiencing family problems. A total of 150 women were randomly assigned to either an intervention or a control group. Data for analysis were available for 126 women; 24 women were lost to the analysis for several reasons (Fig. 1). Table 1 shows the baseline characteristics for all of the patients in the intervention and control groups. Baseline data of the variables and data after 6 months are shown in Table 2. All the variables were normally distributed except progesterone and testosterone. Therefore for the progesterone and testosterone, a nonparametric test (Mann-Whitney *U* test) was used, and for the rest of the variables independent *t*-tests were used.

Results

Pathologic variables are shown in Table 2, TSH, follicle-stimulating hormone (FSH), luteinizing hormone (LH), and prolactin decreased significantly after Yoga *Nidra* practice, compared with the levels noted in the control group. TSH level fell to 3.43 ± 1.98 μIU/mL from the baseline level of 4.07 ± 2.19 μIU/mL; FSH level fell to 14.48 ± 6.68 mLU/mL from the baseline level of 15.96 ± 7.52 mLU/mL; LH level fell to 15.53 ± 8.59 mLU/mL from the baseline level of 17.01 ± 9.05 mLU/mL; and prolactin level fell to 14.88 ± 6.19 ng/mL from the baseline level of 16.74 ± 6.56 ng/mL. As also shown in Table 2, variables, such as estradiol level, increased to 127.41 ± 60.94 Pg/mL from the baseline level of 119.22 ± 62.24 Pg/mL; progesterone level increased to 10.11 ± 7.23 ng/mL from the baseline level of 9.38 ± 7.15 ng/mL; dehydroepiandrosterone-sulfate (DHEA-S) level fell to 1.66 ± 0.92 μg/mL from the baseline level of 1.94 ± 0.97 μg/mL; and testosterone level fell to 2.38 ± 2.07 ng/mL from the baseline level of 3.00 ± 2.48 ng/mL. Pathological variables given in Table 3, TSH, FSH, LH, and Prolactin, significantly decreased after Yoga *Nidra* practice when compared with the control group.

Table 3. Differences between Baseline and Poststudy Values in Hormone Levels in Intervention Group and Control Group

Variables	*Differences in hormone levels*		p-*Value*
	Intervention group (n = 65)	*Control group (n = 61)*	
TSH (μIU/mL)	−0.64 ± 0.61	−0.19 ± 0.98	0.002**
FSH (mlU/mL)	−1.48 ± 1.94	−0.85 ± 1.48	0.04*
LH (mlU/mL)	−1.48 ± 1.11	−0.54 ± 2.07	0.001**
Prolactin (ng/mL)	−1.86 ± 1.42	−1.33 ± 1.25	0.02*
Estradiol (Pg/mL)	8.19 ± 2.61	9.06 ± 2.70	0.06
Progesterone (ng/mL)	0.73 ± 0.48	0.69 ± 0.56	0.69
Testosterone (ng/mL)	−0.62 ± 0.77	−0.57 ± 1.08	0.78
DHEA-S (μg/mL)	−0.29 ± 0.68	−0.16 ± 0.47	0.27

Values are represented as mean ± standard deviation; * represents significant values; **represents highly significant values.
TSH, thyroid-stimulating hormone; FSH, folllicle-stimulating hormone; LH, luteinizing hormone; DHEA-S, dehydroepiandrosterone-sulfate; Pg, prostaglandin.

Discussion

Individuals recruited for this intervention program were patients who had menstrual problems. Patients participating in the intervention group were instructed to follow the Yoga *Nidra* intervention program as prescribed by the researcher. In light of the above results, it is clear that Yoga *Nidra*

Table 2. Hormonal Levels of Subjects Before and After Study in Intervention and Control Groups

Variables	*Groups*			
	Intervention		*Control*	
	Pre (n = 65)	*Post (n = 65)*	*Pre (n = 61)*	*Post (n = 61)*
TSH (μIU/mL)	4.07 ± 2.19	3.43 ± 1.98	3.37 ± 2.18	3.18 ± 2.00
FSH (mlU/mL)	15.96 ± 7.52	14.48 ± 6.68	15.89 ± 7.70	15.04 ± 7.96
LH (mlU/mL)	17.01 ± 9.05	15.53 ± 8.59	16.67 ± 8.95	16.14 ± 7.91
Prolactin (ng/mL)	16.74 ± 6.56	14.88 ± 6.19	15.60 ± 6.81	14.28 ± 6.91
Progesterone (ng/mL)	9.38 ± 7.15	10.11 ± 7.23	8.25 ± 7.62	8.95 ± 7.51
Estradiol (Pg/mL)	119.22 ± 62.24	127.41 ± 60.94	113.47 ± 70.29	122.54 ± 68.96
Testosterone (ng/mL)	3.00 ± 2.48	2.38 ± 2.07	3.00 ± 2.56	2.43 ± 1.98
DHEA-S (μg/mL)	1.94 ± 0.97	1.66 ± 0.92	1.91 ± 1.16	1.74 ± 1.03

Values are represented as mean ± standard deviation.
TSH, thyroid-stimulating hormone; FSH, follicle-stimulating hormone; LH, luteinizing hormone; Pg, prostaglandin; DHEA-S, dehydroepiandrosterone-sulfate.

practice is helpful for preventing menstrual-related problems in reproductive-age women. The practice of yoga generally includes meditation, relaxation (Yoga *Nidra*), breathing exercises, and various physical postures.[30] In addition, adults in a yoga intervention in a study found that yoga was easy to learn and perform.[31] In another study, activity scheduling and relaxation training were effective treatments for spasmodic dysmenorrhea, with both treatments producing improvements in general measures of dysmenorrhea, a symptom-severity measure, and an activity measure.[32]

In a trial of Transcendental Meditation™ (TM) versus TM + *Sidhi* yoga, long-term yoga practice produced a progressive decrease in serum TSH, growth hormone, and prolactin levels over 3 years, while no consistent change in cortisol, T4, or T3 levels was observed. These results suggest that the long-term practice of TM or Meditation™–Sidhi may have effects on neuroendocrine function. Further studies using 24-hour monitoring with frequent blood sampling will, however, be needed to assess fully the significance of the simultaneous decline of the anterior pituitary hormones with maintenance of levels of hormones from peripheral endocrine glands.[25]

In a study conducted at the University of Würzburg, in Germany, researchers measured heart rate (HR); blood pressure (BP); levels of cortisol, prolactin, and growth hormone; and certain psychologic parameters in a yoga-practicing group and a control group of young female volunteers who read in a comfortable position during the experimental period. The yoga group had decreases during the yoga practice. Significant differences between both groups were found in psychologic parameters. The yoga group had significantly higher scores in measures of "high spirits" and "extravertedness."[26]

Yoga therapeutic potentials for addressing various medical conditions, particularly for lifestyle-related ones, have been explored and are being utilized. The four leading risk factors such as overweight, high BP, high blood glucose and cholesterol, which are linked to lifestyle-related chronic diseases, may be reduced by yoga intervention.[33–36] Variables such as estradiol, progesterone, DHEA-S, and testosterone were not statistically significant. Sivsankaran et al. found that none of the laboratory parameters in a study the researchers conducted changed significantly with yoga.[37]

It was observed that after Yoga *Nidra* practice, patients' obtained relief from painful cramps, heavy bleeding, and irregular periods. The symptoms of the patients were reduced in both the intervention and control groups, because both groups were receiving medications, but reductions in the intervention (yoga group) was higher than in control group.

How Yoga *Nidra* works is not fully documented but it has been reported previously that Yoga *Nidra* involves deep relaxation techniques. The relaxation response is characterized by a decrease in the activity of the sympathetic nervous system that results from conditioning and training. During this response, there is a decrease in oxygen consumption, HR, BP, and respiration rate; and an increase in α waves recorded on an electroencephalogram. The relaxation response is not just simple relaxation. In simple relaxation, changes in the rate of respiration, oxygen consumption, and α-wave activity do not occur. The relaxation response is thought to modify the way in which stressful stimuli affect the sympathetic nervous system. A temporary activation of the sympathetic system is important in preparing the body to respond appropriately to stressful situations by the release of substances such as norepinephrine. The prolonged release of these substances, however, can have deleterious effects that include abnormally high blood pressure and disturbances in cardiac rhythm and rate.

Limitations of this study were that amenorrhea, dysmenorrhea, oligomenorrhea, polymenorrhea, menorrhagia, metrorrhagia, and hypomenorrhea were included in the study all together. The sample size was not large enough to analyze the hypomenorrhic group and hypermenorrhic subgroups separately. The phase of the menstrual cycle was based on the participant's reports not on ultrasound scans; this is also a limitation of the study.

Conclusions

The present study demonstrated the efficacy of Yoga *Nidra* on hormone profiles in patients with menstrual irregularities. Yoga *Nidra* practice was helpful in patients with hormone imbalances, such as dysmenorrhea, oligomenorrhea, menorrhagia, metrorrhagia, and hypomenorrhea.

Acknowledgments

The authors express their sincere thanks to the Department of Ayurveda, Yoga, Unani, Shiddha and Homeopathy (AYUSH), Ministry of Health and Family Welfare of the Government of India, for financial support.

Disclosure Statement

No competing financial interests exist.

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