Hatha-yoga as a psychological adjuvant for women undergoing IVF: a pilot study

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**Abstract**

Objectives: To evaluate the influence of Hatha-yoga (HY) practice on distress of women before starting their first in vitro fertilization (IVF) cycle.

Study design: We offered 143 consecutive women with couple infertility the opportunity to attend a free HY course lasting 3 months as a psychological support before starting their first IVF cycle. All women were asked to complete the State-Trait Anxiety Inventory-Y1 (STAI-Y1), Edinburgh Depression Scale (EDS) and General Health Questionnaire-12 (GHQ-12) at baseline (T1) and after 3 months (T2), to evaluate symptoms of anxiety, depression and distress, respectively.

Results: Of the 143 women, 120 completed all three questionnaires. Of these, 45 attended the HY course and 75 did not. At T1, EDS and GHQ-12 scores were significantly higher in the HY group than in the non-HY group. There were no group differences in STAI-Y1 scores. At T2 there were no group differences. When, in each group, the score of each questionnaire at T1 was compared to the score at T2, a significant T1 to T2 reduction was observed in the HY group (p < 0.001 for STAY-Y1 and GHQ-12, p < 0.001 for EDS).

Conclusions: Our data suggest that women who are more distressed are more likely to accept psychological support before starting an IVF cycle and that in these women HY practice is associated with distress reduction.

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**Introduction**

It is well known that infertility can induce emotional distress [1–4]. Reproductive problems, when exacerbated, can cause depression, anxiety, social isolation and sexual dysfunction in both partners [1–5]. Accordingly, women seeking medical care for couple infertility are more anxious and emotionally distressed than those without fertility problems [6]. In line with these observations, infertility has been ranked as one of the greatest sources of stress in a person’s life, comparable to a somatic disease such as cancer [5,7,8].

Although previous studies suggested that stress could exert a detrimental effect on in vitro fertilization (IVF) outcome [9,10], a recent meta-analysis reported that emotional distress caused by fertility problems or other life events co-occurring with treatment will not compromise the chance of becoming pregnant [11]. In fact, IVF failure predicts subsequent psychological distress, pre-IVF psychological distress does not predict IVF failure [12]. Therefore, it has been suggested that instead of focusing efforts on psychological interventions specifically aimed at improving the chance of pregnancy, reducing distress in the IVF context is important as it may help women cope with the stress of treatment and treatment failure [12].

Among different interventions aimed at reducing infertility-related stress, a previous study reported that group interventions emphasizing education and skills training were significantly more effective than counseling interventions emphasizing emotional expression and support [13]. Furthermore, several observations support the physical and mental health benefits of participation in mindfulness training [13–17].
In order to support infertile couples seeking psychological help and to reduce infertility-related stress before starting a medically assisted procreation program, our Infertility Unit, (Azienda Ospedaliero-Universitaria Careggi, Florence, Italy) has been promoting, since 2005, a Service of Psychological Support for Infertile Couples. The service, carried out by dedicated people, is routinely performed alongside doctors during outpatient clinical practice. The service is financed by the Assessorship of Health Rights of Tuscany Region. Among different approaches, Hatha-yoga, a technique of complementary medicine, has recently been included in the program of psychological support.

Yoga is a philosophy aiming at the liberation from the material world and at the mystical union of the self with the Supreme Being in a state of complete awareness and tranquility. It has its origin in ancient India and consists of spiritual and physical practices [18]. Hatha-yoga (HY) is considered the most practical of all yoga disciplines, mainly considering the body as an instrument of liberation. It is concerned chiefly with the regulation of breathing by exercises consisting of various postures designed to maintain healthy functioning of the body and to induce mental calm [18]. HY is considered as one of the best practices for achieving stress reduction and relaxation. According to the HY discipline, mind and body are intimately related. In HY practice, physical postures and breathing exercises improve muscle strength, flexibility, blood circulation and oxygen uptake, as well as the hormonal profile [19]. In addition, the relaxation induced by meditation helps to stabilize the autonomic nervous system with a tendency toward parasympathetic dominance. Accordingly, HY practitioners report several benefits, such as becoming more resilient to stressful conditions [19].

Considering the aforementioned observations, this study was aimed at evaluating the possible benefits of HY practice on stress reduction in women before starting their first IVF treatment.

Materials and methods

Patients and study design

We studied a consecutive cohort of 143 women (mean age 36.7 ± 3.1 years) attending our Outpatient Clinic for the first time from September 2009 to July 2010, seeking medical care for couple infertility and admitted to their first IVF cycle.

All patients had a 3-month waiting period between the first clinic visit and starting treatment. Women were offered the option to participate in an HY program as a form of psychological support during that time. The HY classes were free of charge and participation involved classes twice a week for 3 months in small groups (maximum six people per group).

Irrespective of whether or not patients took part in the HY program, they were asked to complete questionnaires (see below) at the time of being offered HY classes (T1) and 3 months later (T2). At T2 those who did not attend HY classes were asked if they had used any complementary treatment or had other lifestyle changes since T1 in order to account for this as a confounder.

Assessment of anxiety

To assess anxiety we used the State–Trait Anxiety Inventory (STAI) [20], a validated and widely used measure of state and trait-anxiety, in its current revision form Y. The STAI-Y is subdivided into two scales (Y1 and Y2), respectively, assessing state anxiety, with questions relating to how the subject feels at the time of administration of the questionnaire, and trait anxiety, with questions investigating how the subject feels habitually. In particular, we here assessed “state” and not “trait” anxiety, using the state-anxiety scale (STAI-Y1), a 20-item self-report questionnaire that evaluates current feelings of apprehension, tension, nervousness, and worry. Range of scores is 20–80, the higher score indicating greater anxiety.

Assessment of depression

To assess depressive symptoms we used the Edinburgh Depression Scale (EDS) [21], a self-administered scale consisting of 10 items, useful to evaluate non-psychotic depression. Each item comprising the EDS corresponds to a non-somatic symptom of depression including subjective sadness, hopelessness, guilt and thought of deliberate self-harm. For every item there are four possible responses, and each response is rated on a 4-point scale ranging from 0 to 3 in severity. The patients select the statement in each item that seems to fit best with how they have been feeling over the previous 7 days. The total score is calculated from 0 to a maximum of 30. The higher the score, the greater the depressive symptoms.

Assessment of general distress

To assess general distress we used the General Health Questionnaire-12 (GHQ-12) [22,23]. This is a shortened but reliable version of the well-validated GHQ-60, which was designed to detect non-psychotic psychiatric disorder [24]. In this study we administered the Italian version by Fraccaroli and Schadee [25,26]. Each of the 12 items asks if the subject has experienced a particular symptom recently (up to 2 weeks before filling the form) using a four-point scale; in six cases items are negatively formulated, so to reduce the serial respondant effect [27]. The score ranges between 0 and 36. The higher the score, the worse the subject’s distress.

This study was approved by the Institutional Review Board of the Department of Woman and Mother and Baby Health of the University of Florence.

Description of Hatha-yoga (HY) practice

During HY practice, the teacher emphasizes three aspects: the Asana positions, breathing and relaxing, according to previous publications [28,29].

Asana positions are used to invite the mind to remain concentrated and relaxed while the person is moving and breathing according to “full yogic breathing,” which is the sum of thoracic and abdominal breathing [28,29]. Most people use thoracic breathing, short and fast, usually associated with anxiety and agitation. Abdominal breathing is wide and deep, and is what is used in moments of rest, and by children. Adults, with daily stress, shorten their breath and switch to breathe with the thorax. HY helps to get back to learn how to breathe in a calm, deep, conscious way with the abdomen, at any time of the day, not only in the idle state. Changing the way of breathing helps the subject’s body and mind to maintain the steady-state of the organism [28,29].

In our study, the Asana positions were tailored for the infertile patients [28,29], aiming at central nervous system relaxation and stimulation of reproductive organ activation. In the traditional branch of HY, it is essential to respect the eight steps according Patanjali, in a progressive way, and to focus on breathing and on the single movements of the muscles. Specifically, a typical HY lesson consisted of the following Asana positions: makarasana, bhujangasana, dharmikasana, paschimottanasana, sardulasana, bhadrasana, matsyendrasana, savasana (Fig. 1). An accurate description of the Asana positions is available in books dedicated to HY [28,29].

Each lesson lasts one hour and a half: the first part (25 min) helps the patient to remove whole body tension. During the second
part (45 min), the patient focuses on Asana positions, and lastly there is a 20 min-period for deep relaxation.

Data analysis

Data were expressed as mean ± standard deviation (SD) and as percentages when categorical. Unpaired two-sided Student’s t-tests were used for comparisons of means of normally distributed parameters and Chi-square tests were used for comparisons of categorical parameters when the socio-demographic and clinical characteristics the two groups (HY and Non-HY) were compared. The paired two-sided Student’s t-test was used to compare HY and Non-HY T1 and T2 scores. Unpaired two-sided Student’s t-tests were used for comparisons of HY and Non-HY T1 scores and HY and Non-HY T2 scores, respectively. All statistical analysis was performed on SPSS (Statistical Package for the Social Sciences, Chicago, USA) for Windows 17.0.

Results

Among 143 women, 23 did not complete the questionnaires, mainly due to language difficulties, and were excluded from the statistical analysis. Hence, an unselected series of 120 women was studied. The socio-demographic and clinical characteristics of the sample are summarized in Table 1. Among 120 patients, 45 (37.5%) accepted the invitation to attend the HY classes. All HY patients attended all sessions for the T1–T2 three-month period. Patients who did not attend HY classes did not report, at T2, any complementary treatments or changes in lifestyle during the T1–T2 three-month period.

Table 1 reports the demographic and clinical characteristics of women who attended (n = 45, HY group) or did not attend (n = 75, Non-HY group) the HY classes. No differences between the two groups were observed.

T1 and T2 test scores are shown in Table 2. At T1, EDS and GHQ-12 scores were significantly higher in the HY group than in the Non-HY group. There were no group differences in STAI-Y1 scores. At T2 there were no group differences.

Interestingly, when psychological traits mainly investigated by each test (anxiety, depression and distress for STAI-Y1, EDS and GHQ-12, respectively) were considered in the HY group, a significant T1 to T2 reduction of the scores of each test was observed (Fig. 2, Table 2). Conversely, no significant differences between T1 and T2 scores of the three questionnaires were observed in the Non-HY group (Table 2).

Comments

This study aimed to evaluate the influence of HY practice on distress of women undergoing an IVF cycle for the first time. In...
addition, we compared the psychological state of women who attended the free HY classes to those who did not. We observed that more anxious and distressed women looked for psychophysical support, such as HY, before starting their first IVF cycle, and that, in this group, HY practice was associated with a reduction of emotional distress. Considering our results overall, we observed that EDS and GHQ-12 scores of women who decided to attend the HY program were higher at baseline (T1) than the scores of those who did not, while the scores observed at the end of the 3 months (T2) were not significantly different between the two groups. This suggests that women who accepted psychological help before starting IVF were the more distressed patients, and that, at the end of the HY practice, their psychological status was similar to that of women not requiring psychological help at T1.

In addition, our results show a significant reduction of anxiety, depression and distress after 3 months of HY practice before starting the first IVF cycle. In fact, in the HY group, a T1–T2 reduction in distress was observed at the end of a 3-month HY course. The benefits of yoga are described for several indications in medicine [30] and in particular in reproductive medicine [31–34]. In fact, yoga practice induces deep relaxation and meditation in patients undergoing treatment for infertility [31–34]. In addition, it improves mood levels and psychophysical conditions not only during treatment for infertility but also in daily life [35]. In particular, a controlled prospective non-randomized study conducted in 24 self-referred women who perceived themselves as “emotionally distressed”, where 3-month yoga program participation was offered to women, demonstrated that women who participated in the yoga training experienced significant improvements in perceived stress, anxiety, well-being, vigor, fatigue and depression compared to those on a waiting-list [36]. We report that HY can help in reducing distress before the beginning of an IVF cycle. In this situation, HY program, acting on body and mind, can be considered a good option to improve the psychophysical status of distressed women undergoing their first IVF cycle.

Regarding benefits of yoga on women’s reproductive health, it has been reported that yoga and meditation can help women experiencing the challenges of infertility [35]. The practice of meditation and relaxation can help increase clarity of mind, maintain healthy body chemistry, and give patients the patience to undergo the rigours of infertility treatments [35]. Data regarding a positive impact of yoga practice on stress and anxiety have been reported also in pregnant women. In particular, women practising yoga in their second trimester showed reduced perceived stress and anxiety in their third trimester [37].

Other interventions to improve psychological wellbeing among infertile women are described in the literature. These include the use of complementary and alternative medicine (CAM) such as acupuncture, homeopathy, and herbal therapy [37]. Some studies report that acupuncture can reduce anxiety symptoms in women undergoing IVF [38] and infertility-related stress [39], but further studies are advocated by the authors. Regarding other CAM techniques, they have become increasingly popular for the treatment of a variety of female conditions, including dysmenorrhea, premenstrual syndrome, infertility, nausea and vomiting during pregnancy, and symptoms of menopause [40–42]. In general, although some benefits have been reported in these conditions, with a possible positive impact on psychological wellbeing, there is a deficit of well-designed, randomized, controlled trials to evaluate the efficacy and safety of CAM for these indications, which makes it difficult to provide evidence-based recommendations [40–42].

This study has some limitations. First, we evaluated a relatively small sample of woman seeking infertility treatment. Second, the period of the study was relatively short (3 months), although the validity of the study is confirmed in literature [36]. Third, it cannot

Table 2
Results of the three psychometric tests performed to assess anxiety (STAI-Y1), depression (EDS) and distress (GHQ-12) baseline (T1) and after 3 months (T2).

<table>
<thead>
<tr>
<th></th>
<th>Yoga (n = 45)</th>
<th>No yoga (n = 75)</th>
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<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
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<tr>
<td>STAI-Y1 mean score</td>
<td>43.16 ± 9.66</td>
<td>37.67 ± 8.89</td>
</tr>
<tr>
<td>EDS mean score</td>
<td>9.27 ± 5.50</td>
<td>6.60 ± 4.77</td>
</tr>
<tr>
<td>GHQ-12 mean score</td>
<td>12.56 ± 5.82</td>
<td>9.47 ± 5.42</td>
</tr>
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</table>

A comparison of the scores at the time T1 and T2 for all the questionnaires reported has been performed in the two groups, Yoga and No Yoga. STAI-Y1, State–Trait Anxiety Inventory-Y1: range from 20 to 80. EDS, Edinburgh Depression Scale: range from 10 to 30. GHQ-12, General Health Questionnaire-12: range from 0 to 36. T1: score at the beginning of the study. T2: score 3 months after the first psychometric assessment.

Fig. 2. Comparison of the scores at the time T1 and T2 for all the questionnaires reported in the yoga group. STAI-Y1, State–Trait Anxiety Inventory-Y1: range from 20 to 80. EDS, Edinburgh Depression Scale: range from 10 to 30. GHQ-12, General Health Questionnaire-12: range from 0 to 36. T1: Score at the beginning of the study. T2: score 3 months after the first psychometric assessment.
be excluded that, in the HY group, not the HY itself, but a placebo effect of “doing something” led to a T1 to T2 reduction in the questionnaires scores in the measures used to investigate psychopathology. Hence, prospective randomized studies are required. The results of the present study, however, add to the existing evidence about the usefulness of psychophysical support for women undergoing IVF and show that HY practice is effective in reducing distress in more anxious patients. Forth, the complexity and duration of the HY program limit its potential usefulness. The duration of the HY program might be prohibitive for many patients who may not be able to afford the financial cost of or the time involved in participation. To confirm efficacy of the HY program, other studies conducted in different settings are needed. This study, however, has the strength of having evaluated symptoms of anxiety, depression and distress with validated instruments.

To confirm our results, further prospective randomized studies using larger samples and longer periods of follow-up are required.

Conclusions

The current study supports previous research suggesting that HY may have a beneficial effect in reducing anxiety, depression and distress in woman undergoing IVF. In addition, psychophysical support seems more important in those women who are more anxious and distressed.

Condensation

Women with more distress are more likely to accept psychological support before starting IVF, and in these women Hatha-yoga practice is associated with distress reduction.

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None.

Conflict of interest statement

None.

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Conflict of interest statement

None.

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