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The effect of problem-solving skill training on mental health and the success of treatment of infertile women under intrauterine insemination treatment

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Abstract:

INTRODUCTION: Using fertility treatment will cause high levels of anxiety and depression. The study was carried out with the objective of determining the effect of problem-solving skills (PSS) training on mental health and the success of treatment of infertile women under intrauterine insemination (IUI) treatment.

MATERIALS AND METHODS: this randomized clinical trial was carried out on 72 women referring to Milad Infertility Center in Mashhad. Individuals were randomly assigned into control and intervention groups. PSS were taught in three sessions in the intervention group, and the control group received usual care. The success rate of therapy and the mean of anxiety and depression on the day of IUI operation were compared using the Beck Depression Inventory and Spielberger Anxiety Inventory in both groups. *t*-test, Mann-Whitney, paired *t*-test, Wilcoxon, and Chi-square tests were used to analyze the data.

RESULTS: on the day of IUI operation, the mean score of state anxiety in the control group (50.11 ± 8.51) and PSS (68.12 ± 11.49) was significant ($P < 0.001$), trait anxiety in the control group (46.41 ± 8.70) and PSS (44.00 ± 9.92) was significant ($P < 0.001$), and depression in the control group (17.44 ± 11.70) and PSS (12.99 ± 8.99) was significant ($P < 0.001$); however, the success of treatment in both groups (14.7% and PSS (26.5%) was not significantly different ($P = 0.230$).

CONCLUSION: Considering the effect of problem-solving on reducing anxiety and depression, it is suggested that infertility center of this intervention should be used.

Keywords:

Education, infertility, intrauterine insemination, mental health, problem-solving, treatment success

Introduction

Infertility refers to the inability to fertilize after 1 year of regular and unprotected sexual intercourse which can be observed in primary and secondary forms.^[1] Infertility imposes an extreme level of stress on infertile couples as a psychosocial and social crisis and leads to impaired quality of marital relationships, diminished intimacy,

fear of termination of marital relationship, decreased self-esteem, depression, feelings of rejection, and helplessness.^[2]

One of the methods of fertility aid is the intrauterine insemination (IUI) treatment. IUI method in combination with ovulation stimulation is commonly considered as the first-line treatment for many infertile couples. IUI treatment is mainly used to treat

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male infertility, unjustifiable infertility, and spontaneous immunity against sperm, sexual dysfunction, and cervical cancer.^[3]

IUI treatment is more cost-effective and less invasive compared to *in vitro* fertilization (IVF) treatment, and it is one of the most commonly used therapies.^[4,5] According to the statistics of Milad Infertility Center of Mashhad in 2010, IUI treatment (88,831) was used more than other aids from the total number of referrals to the center (13,103,422) who received fertilized treatment.

Performing fertility aid treatments leads to a lot of psychological stresses in patients in addition to the need to spend time and money.^[6] In the study by Behdani *et al.* (2005), the most common psychiatric disorder in infertile women undergoing fertility aid treatments was distributed anxiety disorder (44.4%), other anxiety disorders were reported to be in 11.8%, and depression was reported to be in 30.4% of patients.^[7] In the study by Lin *et al.*, 35% of patients undergoing IUI treatment had sleep disorder,^[8] and in the study by Kokanali *et al.*, most women undergoing IUI treatment had moderate anxiety.^[9]

In the study by Moosavifar *et al.*, there was a relationship between the mean of anxiety and success in treatment and success in treatment decreased with increasing state and trait anxiety, but there was no relationship between different levels of depression and success in treatment.^[10] There was a relationship between the level of anxiety and depression and the success of IVF treatment in the study by Peivandi *et al.*, and relative risk and associated risk for lack of occurrence of pregnancy in individuals with high severity of anxiety and depression were, respectively, 1.5% and 33%.^[11] In the study by Kokanali *et al.*, the state anxiety level during treatment with IUI was significantly associated with the success of the treatment in addition to factors such as age, ovarian status, and folic acid numbers. The level of state anxiety was significantly lower in patients who had successful treatment compared to patients with failed treatment ($P < 0.001$), but there was no significant relation between the success of the treatment and the trait anxiety ($P = 0.125$).^[9]

A limited number of studies have been reported about anxiety and depression of women treated with IUI so far. In the study by Heidary *et al.* on 110 infertile women treated with cognitive behavioral therapy IUI treatment, the mean state anxiety ($P < 0.001$) and trait anxiety ($P < 0.001$) decreased significantly in the intervention group.^[6] The problem-solving is an essential component of cognitive-behavioral therapy.^[12] All cognitive-behavioral therapies are considered as a problem-solving method and individuals use those to learn the method of thinking about problems. The

problem-solving is the cognitive-behavioral process which is guided by the individual him/herself and that individual tries to use it and find effective or adaptive solutions to his/her daily life problems.^[13]

This training is expanding on a daily basis due to its prominent characteristics such as having structure, being in short-term, having simple and understandable principles for patients, possibility of its implementation by trained health personnel.^[14]

The problem-solving is an important coping strategy which enables an individual to thwart the problematic situations of everyday life and their emotional impact.^[15] In the study of Zwick (2003), a positive attitude toward the problem and logical problem-solving was related to a reduction in the symptoms of depression in infertile women.^[16] Many psychiatric distresses in infertile women are the result of maladaptive and ineffective coping strategies and poor adaptation lead to symptoms of anxiety and depression in infertile women. Problem-solving is one of the most important coping strategies in dealing with infertility, treatments, and many of its psychological effects.^[16]

No similar studies have been reported on the effect of problem-solving skills (PSS) on anxiety and depression in infertile women so far. Lotfinia *et al.* concluded in their study on male and female students of Tabriz University that training of PSS is effective in decreasing depression severity of students and the mean of depression in the PSS group was significantly lower than the control group ($P < 0.001$).^[17] Given that limited studies have been conducted on anxiety and depression in women under IUI treatment up until now and with respect to characteristics of PSS, having simple and understandable principles for patients and the possibility of their implementation by the health staff, researcher decided to make an intervention aimed at determining the effect of PSS on the anxiety of infertile women undergoing IUI treatment who referred to Milad Infertility Center in Mashhad in 2015–2016.

Materials and Methods

This randomized clinical trial with two groups was conducted on 72 women with primary infertility, aged between 18 and 40 years who referred to Milad Infertility Center of Mashhad since December 2015 to June 2016 and have criteria for entering the study. The researcher acted on taking samples after approval of subject by research committee of the Ethics Committee of Mashhad University of Medical Sciences (IRCT2016020926490N1). The research units were randomly assigned to the control and intervention groups. Name of groups are written on the same paper for the first time period and the control

group was selected and the PSS group was selected for the second time period and sampling was done in an accessible manner.

Sample size according to Cohen table (1987) was calculated 10% drop in samples and determined the number of individuals in each group to be 36 with a power of 80% and a confidence of 95% with effect size of 70%.^[18] In the end, data obtained from 34 individuals in the control group and 34 individuals in the PSS group were analyzed. Entry criteria included having Iranian nationality, age between 18 and 40 years, literacy and writing skills, primary infertility, and score <28 from the general health questionnaire (GHQ) and exclusion criteria were included history or current infection of mental illness (psychiatric disorders [diagnosed by a specialist] mood disorders requiring serious intervention or admission to psychiatric illnesses), the medical condition (cardiopulmonary disease, hypothyroidism, epilepsy, high blood pressure, immune system disorders [diagnosed by a specialist]), the occurrence of a stressful event (a serious illness of one's own, one's spouse, close friend's death, the death of first-degree relatives, house theft, accident, migration, severe marital dissension), the disease during the past 6 months, using smoke, hookah, alcohol, or drugs, and acquiring anxiety score higher than 53 from the Spiel Anxiety Inventory and depression score >28 from the Beck Depression Inventory, cancellation of the IUI cycle, and lack of participation in all training sessions and lack of willingness to continue to collaborate in research.

The tools used in this study included Personal Inventory Questionnaire and Information related to Infertility, Spielberger Anxiety Inventory (STAI), Beck Depression Inventory, GHQ, and checklist of implementation of PSS.

Personal Inventory Questionnaire and Information related to Infertility had 18 questions and consisted of two parts of the individual profile and information about infertility.

The STAI has 40 expressions. These expressions measure two scales of state anxiety and trait anxiety as "state" and "adjective" in a way that 20 expressions measure state anxiety "state" and 20 expressions measure trait anxiety "trait."

The Beck Depression Inventory has 21 questions, and the answers are scored between 0 and 3. Minimum and maximum points for this questionnaire are 0 and 63 which are classified in the form of nondepression (0–13), mild depression (14–19), moderate depression (20–28), and severe depression (29–63).

GHQ-28 consists of 28 questions and measures physical symptoms, anxiety and sleep disturbances, and disturbs

social function and severe depression. The cutting score in this questionnaire is 28 and a score over 28 is a sign that a person is prone to mental illness.

Checklist for the implementation of problem-solving skills

This checklist is designed by the researcher based on problem-solving steps and consists of recording stressful situations during the treatment with IUI, individual solutions for controlling these situations, evaluating solutions and implementing the chosen solution, and evaluating the desired solution, and the individual was asked to record situations that are problematic for him/her and perform the problem-solving steps during the treatment.

Validity of the questionnaire of personal information and infertility information and the checklist for problem-solving were confirmed using qualitative content validity in a way that these were designed by studying books and articles on the topic of research under supervision of supervisors and consultants and were then provided for seven faculty members and experts from Mashhad University of Medical Sciences for evaluation, and the final tools were used after providing the necessary suggestions and amendments, and personal information questionnaire and information on infertility and checklist for problem-solving checklist have explicit phrases which have been prepared with regard to similar studies, advice provided by counselors and consultants based on relevant scientific books. In the present study, their reliability has been confirmed and the reliability of state anxiety ($r = 0.77$), trait anxiety ($r = 0.71$), depression ($r = 0.83$), and general health ($r = 0.83$) inventories was confirmed by Cronbach's alpha coefficient.

Infertile women who were eligible for treatment planning for IUI treatment on the 1st day of treatment (2–3 days of menstrual cycle) were identified and enrolled in the study. The intervention was conducted by the researcher after confirmation of the researcher's ability in holding PSS sessions by Clinical Psychologist Ph. D. Advisor. The duration of each session was 45–45 min according to the time of referral of the research units to the treatment centers as follows:

The focus in the PSS group in the first session (2–3 days of the first menstrual cycle) was on the issues of orientation and defining problem and session contents were definition and causes of infertility, levels of IUI treatment, role of using PSS to deal with everyday life problems, method of defining the problem, and the factors involved in the occurrence of the problem. Then, each research unit was asked to define her problem and determine factors that contribute to the problem. At

the end of the session, the person was asked to make a follow-up list of the issues that the person was involved with and define them accurately and then prioritize them and identify the most important problems during the IUI treatment. The focus in the second session (9–12 days of menstrual cycle) was on the process of providing solutions, contents of the session were teaching about method of providing solution using brainstorming method, and each participation was asked to use brainstorming method to create solution for her problem and prepare a list of solutions that comes to her mind until the next session. The focus in the third session (14–15 days of menstrual cycle) was on the level of evaluating solutions, decision-making and implementation of solution, and method of evaluating solutions, contents of the session were training on method of evaluating disadvantages and the benefits of implementing solutions, choosing the best solution and implementing solutions, and evaluating the effectiveness of the solution, and the contents taught in the previous sessions were reviewed at the end of the session and the person was asked to practice PSS in dealing with her daily issues and record those in the PSS training checklist. The control group received the usual services from the center and on days 2–3, 9–12 and 14–15 days of menstrual cycles referred, to Milad Infertility Center for the treatment of IUI for ultrasound examination and determination of therapeutic measures. STAI and Beck Depression Inventory were completed by both groups in the day of IUI operation (2–3 days after the last training session of problem-solving training). In the end, the success of

treatment, anxiety, and depression were compared on the day of IUI operation in two groups.

Statistical analysis

Data were entered into a computer after collecting and encoding, and data were analyzed by Statistical Package for the Social Sciences, version 16, SPSS Inc, Chicago, Illinois, USA (SPSS 16) and *t*-test, Mann–Whitney, paired *t*-test, Wilcoxon, and Chi-square were carried out. *P* was considered to be <0.05 at a significant level.

Results

In the end, data obtained from 34 individuals in the control group and 34 individuals in PSS group were analyzed and two individuals, in the control group and one individual in PSS group were excluded from the study due to cancellation of the treatment program and one individual from PSS group was excluded due to lack of willingness to cooperate [Figure 1]. In this study, both groups were homogeneous in terms of educational level (*P* = 0.821), socioeconomic status (*P* = 0.714), history of assisted reproductive techniques (*P* = 0.483), and infertility factor (*P* = 0.824) [Table 1].

The mean general health score in the control group was 25.85 ± 3.39 and in PSS group was 25.28 ± 4.20 and both groups were homogeneous in terms of this variable (*P* = 0.778, *Z* = 0.285).

Mean anxiety score before intervention had significant difference in two groups (*P* < 0.001) and two groups

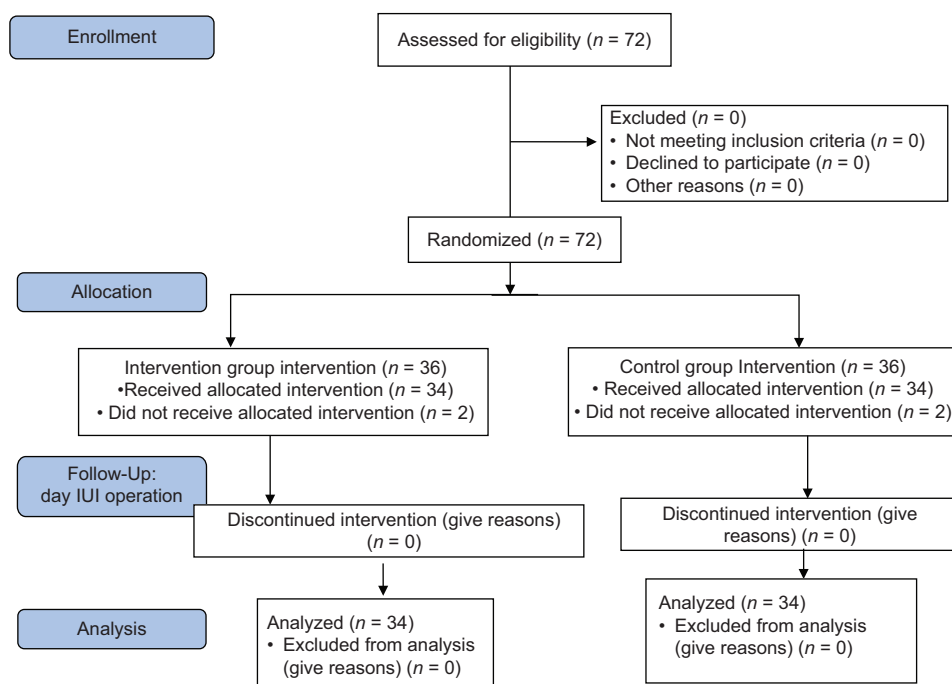


Figure 1: Describing the stages of performing the intervention

were not homogeneous in terms of this variable. The score of state anxiety with the use of Covariance analysis before intervention showed that the mean state anxiety on the day of IUI has a significant difference in both groups ($P < 0.001$, $F = 30$). Based on the results of paired t -test, the mean of state anxiety scores in the PSS group was significantly decreased ($P = 0.004$) but it increased significantly in control group ($P = 0.024$). There was a significant difference in mean of state anxiety on the day of IUI operation ($P < 0.001$) [Table 2].

There was no significant difference between the mean scores of trait anxiety before intervention in both groups ($P = 0.13$) and the two groups were homogeneous in terms of this variable.

Based on Wilcoxon test results, the mean scores of hidden anxiety in the PSS group were significantly decreased ($P = 0.002$), but increase in the mean of trait anxiety score in the control group was not statistically significant ($P = 0.726$). The mean scores of trait anxiety in both groups were significantly different on the day of IUI operation ($P < 0.001$) [Table 3].

The mean of depression scores before intervention in the two groups was significantly different ($P < 0.001$), and two groups were not homogeneous for this variable. Using covariance analysis, depression scores before and after intervention showed that mean depression in IUI operation has a significant difference in two groups ($P = 0.004$, $F = 8.86$). Based on the results of paired t -test, the mean depression score in the PSS group was significantly decreased ($P < 0.001$), but there was no significant difference in the control group ($P = 0.718$). On the day of IUI, mean depression was significantly different in two groups ($P < 0.001$) [Table 4].

The success rate of therapy was higher in the PSS group, but the results of the Chi-square test showed that the success rate of treatment in the control and PSS training groups ($P = 0.230$) was not statistically significant [Table 5].

Discussion

The results of this study showed that PSS are an effective on the anxiety of infertile women undergoing IUI, and mean of state anxiety and trait anxiety in the PSS group was significantly lower than the control group.

In the study by Adarvishi *et al.* on operating room students in Ahvaz Jundishapur University of Medical Sciences, there was a significant reduction in the level of state anxiety of students in the PSS group,^[19] which was consistent with the results of our study.

Table 1: Distribution of infertile women treated with intrauterine insemination in terms of their education, socioeconomic status, history of assisted reproductive techniques, infertility factor in the control and problem-solving skills group

Variable	Group			Test results
	Control, n (%)	PSS, n (%)	Total, n (%)	
Level of education				
Elementary	7 (19.4)	4 (11.1)	11 (15.33)	$Z = -0.226$ $P = 0.821^*$
Secondary	5 (13.9)	6 (16.7)	11 (15)	
High school	8 (22.2)	11 (30.6)	19 (26.4)	
Academic	16 (44.4)	15 (41.6)	31 (43.1)	
Socioeconomic status				
Floor 2	21 (60.00)	20 (54.1)	41 (63.6)	$Z = -0.367$ $P = 0.714^*$
Floor 3	10 (28.6)	12 (32.4)	22 (29.5)	
Floor 4	5 (11.4)	5 (13.5)	10 (6.8)	
History of assisted reproductive techniques				
No	17 (47.2)	20 (55.6)	37 (53.5)	Exact $\chi^2 = 2.650$ $P = 0.483^{**}$
IUI	14 (38.9)	9 (25)	23 (32.4)	
IVF	0	0	0	
Other	5 (13.9)	7 (19.4)	12 (14.1)	
Infertility factor				
Feminine	4 (11.1)	4 (11.4)	8 (11.3)	Exact $\chi^2 = 1.370$ $P = 0.727^{**}$
Masculine	10 (27.8)	14 (40)	24 (33.8)	
Common	8 (25)	8 (20)	16 (22.5)	
Unknown	13 (36.1)	10 (28.6)	23 (32.4)	

*Mann-Whitney, **Precise Fisher. IUI=Intrauterine insemination, IVF=In vitro fertilization, PSS=Problem-solving skills

Table 2: Comparison of mean and standard deviation of state anxiety before intervention and on intrauterine insemination operation day in control and problem-solving skills groups

Variable	Group (mean±SD)		Test results (t-test)
	Control	PSS	
State Anxiety			
Before intervention	47.8±9.5	55.56±11.53	$t = 39.17$ $P < 0.001$
IUI day	51.08±11.5	49.11±12.68	$t = 34.27$ $P < 0.001$
Mean changes in anxiety before intervention and IUI day	3.73±9.17	-6.41±12.11	$t = 0.933$ $P = 0.354$
Paired t-test results	$t = 2.374$ $P = 0.024$	$t = 0.308$ $P = 0.004$	

IUI=Intrauterine insemination, PSS=Problem-solving skills, SD=Standard deviation

In the study by Heidary *et al.* on infertile women undergoing IUI treatment after three sessions of cognitive-therapeutic training, they had a significant difference between the mean changes in state anxiety and trait anxiety in the control and intervention groups,^[6] and in the study of Hamid (2011), stress management based on cognitive behavioral therapy was effective in reducing anxiety in infertile women^[20] which were aligned with the results of this study. All of cognitive-behavioral therapies

Table 3: Comparison of mean and standard deviation of trait anxiety before intervention and on intrauterine insemination operation day in control and problem-solving skills groups

Variable	Group (mean±SD)		Test results (t-test)
	Control	PSS	
Trait anxiety			
Before intervention	42.62±6.96	49.52±5.41	Z=1.508 P=0.131*
IUI day	46.41±8.70	44.0±9.92	t=39.94 P<0.001**
Mean changes before intervention and IUI day	0.30±6.38	5.26±8.72	t=2.88 P=0.005**
Wilcoxon test results	Z=0.351 P=0.726	Z=3.06 P=0.002	

*Mann-Whitney, **t-test. IUI=Intrauterine insemination, PSS=Problem-solving skills, SD=Standard deviation

Table 4: Comparison of mean and standard deviation of depression anxiety and on intrauterine insemination operation day in control and problem-solving skills groups

Variable	Group (mean±SD)		Test results (t-test)
	Control	PSS	
Depression			
Before intervention	17.83±9.96	19.13±8.67	t=16.62 P<0.001
IUI day	17.44±11.07	12.91±8.99	t=12.19 P<0.001
Mean changes before intervention and IUI day	-0.61±9.89	5.55±6.15	t=2.32 P=0.023
Paired t-test results	t=-0.364 P=0.718	t=5.266 P<0.001	

IUI=Intrauterine insemination, PSS=Problem-solving skills, SD=Standard deviation

Table 5: Frequency distribution of treatment success rate with intrauterine insemination in control group and problem-solving skills

Variable	Group			Test results (χ ²)
	Control, n (%)	PSS, n (%)	Total, n (%)	
Success of the treatment				
No	29 (85.3)	25 (73.5)	54 (79.4)	χ ² =1.439
Yes	5 (14.7)	9 (26.5)	14 (20.6)	P=0.230

PSS=Problem-solving skills

are considered as a problem-solving method and those teach individuals how to deal with problems.^[13] The problem-solving process involves methods that one uses to control his/her thoughts and actions, as well as his/her emotions to deal with stressful situations.^[13] The ability to solve the problem is known as an important mediator in depression and anxiety disorders.^[21,22]

There was no statistically significant difference between distress of women in PSS group and control group in the study by Schwartz *et al.* on women treated for breast cancer, which was not consistent with the results of

this study. Problem orientation was not used to teach PSS in the study by Schwartz *et al.*, and four steps of problem definition, presentation of solutions, decision-making, and implementation of the solution were taught. The direction of the problem reflects the general response of individuals to their real problems, and it is among the factors which can affect problem-solving training. The general orientation of a person in terms of ratio of position has a decisive influence on his response.^[24]

The results of the present study showed that PSS is effective on depression of infertile women undergoing IUI. The mean of depression in the PSS group was significantly lower than the control group.

In the study of Talae *et al.*, the mean depression of infertile women in the cognitive-behavioral group was significantly lower than the control group^[25] that was aligned with the results of our study.

In the study of Toozandehjani (2014), after eight sessions of reality therapy, the mean of depression in infertile women treated with IUI in the intervention group was significantly lower than the control group^[26] that was aligned with the results of our study.

In the study of Kordi (2012), after five sessions of problem-solving training, the rate of postpartum depression was significantly reduced in the problem-solving training group that was aligned with the results of our study.

In the study of Tezel (2006), although postpartum depression had a significant reduction in PSS group, nursing care was more effective than problem-solving training in reducing postpartum depression. Bell and D’Zurilla examined the effect of PSS in the meta-analysis study and concluded that although PSS are effective in reducing depression, PSS are not more effective than other treatment methods.^[27] The problem-solving process involves methods that are used by individual to control his/her thoughts and actions, as well as to regulate his/her emotions against stressful situations. The ability to solve the problem increases hope, ability to control, positive emotions and decreases anxiety and depression in individuals.^[13] Infertility is in fact a complex crisis in life which is psychologically threatening and tense and infertile couples face a variety of physical and psychological problems.^[2,28] Problem-solving is one of the most important coping strategies in dealing with infertility, treatments, and many of its psychological effects.^[16]

The results of the present study showed that there was no significant difference between the two groups in the success of the treatment in the control group and the

PSS training in the present study, but the percentage of success was higher in the problem-solving training group which is clinically important. In the study by Nkavnd *et al.* (2015), although after training the relaxation technique, the mean anxiety of women treated with IVF significantly decreased, there was no significant difference in treatment success in the intervention and control group^[29] that was aligned with the results of our study.

In the study by Hamid (2010), the success of treatment in the cognitive-behavioral group was significantly more than the control group,^[20] which was not consistent with the present study.

In the study by Mousavifar (2006), there was a relationship between the mean anxiety and the treatment success and increasing state and trait anxiety reduced the success of treatment but there was no significant relation between depression and treatment success^[10] and there was no significant relation between the level of anxiety in infertile women and the outcome of autism therapies in the study by Simbar *et al.* (2008).^[30] In the study by Abolmasoomi *et al.* (2014), factors such as type of infertility, cause of infertility, duration of infertility, abnormal sperm condition, increased age, and obesity and being overweight in infertile women were the most important factors in the failure of IUI treatment.^[31]

Even though there is a controversy about the effect of supportive and psychological interventions on the success rate of the outcome of fertility aid, counseling and support interventions are needed to be used to help infertile women during the treatment and the waiting period for treatment outcome since the diagnosis and treatment of infertility lead to high levels of anxiety in women undergoing infertility treatment.^[6,9,32]

Adaptation of training sessions with the research programs of research units is one of the strengths of this study, but weaknesses in the study were short distance of last session of training with posttest time due to lack of referral of research units to the Infertility Center after the termination of IUI treatment. In addition, due to the implementation of the sessions by the researcher, there was no possibility of double blindness in the study which reduces the universality of the study, and it was not possible for researcher to control all variables due to individual differences and self-checking of the questionnaires.

Conclusion

In this study, PSS did not affect the success rate of treatment with IUI, but it was effective on mental health of infertile women undergoing IUI treatment in

a way that their depression and anxiety were reduced. Hence, this training can be used to reduce anxiety and depression during IUI treatment.

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Conflicts of interest

There are no conflicts of interest.

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