

The effectiveness of meta-cognitive therapy on anxiety sensitivity, psychological distress and pain indicators in female students with premenstrual syndrome

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Abstract

Introduction: Premenstrual syndrome is one of the most common problems of women of reproductive age, which has negative effects on their personal, social and academic health. The aim of this study was to determine the effect of metacognitive therapy on anxiety sensitivity, psychological distress and pain indices in premenstrual syndrome.

Methods: This study was a quasi-experimental with pretest, posttest and control group with two months follow-up. The statistical population included all the female students with premenstrual syndrome in the Islamic Azad University of Kermanshah during the year 2021, from which 30 people were selected using the available method and based on the Fleiss equation and were assigned to two groups. Metacognitive therapy was applied to the subjects in the experimental group during 10 weekly sessions and each session lasted 90 minutes, but the control group did not receive therapeutic intervention. For data collection, premenstrual symptoms screening tool Steiner et al, psychological distress questionnaire Loibond and Loibund, anxiety sensitivity questionnaire Floyd et al, pain questionnaire McGill, and pain acceptance McCracken et al, were used. Data were analyzed with descriptive statistics, analysis of variance with repeated measurements and SPSS-26 statistical software.

Results: The results showed that anxiety sensitivity ($F=17.75$, $P=0.005$ and $\eta=0.61$), pain intensity ($F=6.18$, $P=0.009$ and $\eta=0.54$), pain acceptance ($F=10.70$, $P=0.014$ and $\eta=0.62$) and psychological distress ($F=43.45$, $P=0.001$ and $\eta=0.60$) in the experimental group compared to the control group significantly decreased and these positive effects remained stable during the two-month follow-up period.

Conclusion: Metacognitive therapy is effective in improving pain indicators and reducing anxiety sensitivity and psychological distress in premenstrual syndrome, and this program can be recommended as a useful treatment to trauma and pain clinics.

Keywords: Anxiety Sensitivity, Dysmenorrhea, Meta-Cognitive Therapy, Psychological Distress, Pain Indicators

Received: 8/March/2022

Accepted: 1/October/2022

Citation: Solgi Z., Merati A.. The effectiveness of meta-cognitive therapy on anxiety sensitivity, psychological distress and pain indicators in female students with premenstrual syndrome, Family and health, 2022; 12(3):

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Introduction:

The American College of Obstetricians and Gynecologists defines premenstrual syndrome as a clinical disease that appears with the occurrence of physical and mental cycle's unrelated to any natural disease during five days before menstruation and four days after the onset of menstruation should be completed in three consecutive cycles with sufficient intensity (1). Most women of reproductive age may experience physiological discomfort in the week or so before menstruation. These symptoms are different in different people and can have a negative impact on work life, personal life and create stress in social relationships (2 and 1).

Evidence from studies in developed countries indicates that the prevalence of pain to menstruation ranges from 35 to 65% (3). However, in the studies conducted in Iran, there is no consensus prevalence of this pain among young Iranian women and girls, and very contradictory statistics have been reported in the range of 38 to 91% (4). Studies on the prevalence of menstrual pain have shown that there are various factors related to this disorder, including young age, smoking, premature menarche, long periods of bleeding and pelvic infection, socio-economic status, level of education and personality types; but what is common is the higher prevalence of premenstrual syndrome in young girls with disturbed psychological status (6, 5).

The range of emotional symptoms of premenstrual syndrome including outbursts of anger, irritability, confusion or suicidal thoughts in the five days before menstruation in each of the three previous menstrual cycles and the range of physical symptoms of premenstrual syndrome including breast tenderness, swelling of limbs, Abdominal bloating, fluid retention or headache and mood problems and anxiety sensitivity during the five days before menstruation in each of the three previous menstrual cycles are defined (7). In fact, an anxiety construct that has received wide attention in the study background of problems with a common physical-psychological background is anxiety sensitivity. It seems that anxiety sensitivity is one of the important mediating variables between stress and disease, and it is assumed that anxiety sensitivity is a stable tendency variable that shows the desire to interpret the physical, psychological and social consequences of anxiety experiences as It is annoying and dangerous (9 and 8). Anxiety sensitivity refers to the fear of anxiety and the related to anxiety and comes from the belief that these symptoms lead to potentially harmful physical and psycho-social consequences (10).

Anxiety sensitivity leads to biases in retrieving and processing information related to anxiety-inducing stimuli, which provides the basis for greater perception of pain in those suffering from psycho-biological disorders (11). Anxiety sensitivity is considered as a risk factor for the development of anxiety and mood problems, but despite this, studies show that this structure is associated with many psychological consequences, including in patients with pain (12). At the same time, studies show the relationship between the severity of physical, emotional and social symptoms in different populations with increased mental distress (13-15). Psychological distress is defined as a non-specific syndrome that includes constructs such as anxiety, depression, cognitive problems, irritability, anger, or obsession (16).

The results of studies indicate that psychological distress as an emotional disorder may affect people's social performance and daily life (17). Psychological distress is a specific discomfort and emotional state experienced by people temporarily or permanently in response to specific stresses

and traumatic requests. In addition to this mental distress, there are unpleasant mental states of depression and anxiety, which have both emotional and physiological symptoms (18). Patients with premenstrual syndrome experience different levels of anxiety and depression, which are very important components of psychological distress. In this context, some studies have shown that in PMS sufferers, the prevalence of mood and anxiety disorders is twice that of the normal population (20 and 19).

In these patients, the issue of psychological distress can ultimately cause the person's frustration and indifference, which in turn leads to the problem of compliance with treatment and non-compliance with programs related to healthy lifestyles and diets. Had, that this is one of the important problems in the health system in women's diseases (21). According to the reports of many PMS sufferers, when facing stressful situations, the perception of pain intensity increases (22). Studies consider the cause of this phenomenon to be destructive cognitive factors, i.e., irrational and negative beliefs such as panic and catastrophizing, as well as the use of passive coping resources such as avoiding stressful situations. These factors cause the vicious cycle of negative emotions to pain, feeling of failure, increasing psychological distress and perception of pain intensity (23 and 2).

Based on the pain gate control theory, pain can affect the mental processes related to feeling, cognition, emotion and behavior, so that this gate is not only stimulated by peripheral inputs but also by centers. The higher part of the brain, which is responsible for thoughts, emotions and behaviors, is also controlled (24). The results of studies also show that not all chronic pain sufferers become disabled. Among these, there are patients who continue to perform their usual tasks and activities despite the pain intensity (26 and 25). In recent years, there has been a lot of interest in identifying adaptive mechanisms through which these people maintain their psychological health and functional ability (25). One of these positive psychological factors is acceptance of pain. Acceptance is not another form of coping, giving up, ignoring pain or increasing behavioral activity with the aim of controlling pain, but the meaning of acceptance is changing the control goal from uncontrollable events (pain itself and negative emotions associated with it) to controllable factors. (27).

Studies have shown that greater acceptance of pain is associated with better social, physical and psychological functioning and the level of pain acceptance has been able to predict the level of pain interference in daily life as well as the level of physical and psychological health and the intensity of pain (27 and 25). The results of some studies also indicate that acceptance is a stronger predictor of psychological distress and disability caused by perceived pain intensity compared to a number of pain coping strategies (28). Medicines such as prostaglandin inhibitors are usually used in the treatment of premenstrual syndrome. Indomethacin and phenylbutazone, nifedipine and combined birth control pills and other types of painkillers are also used to reduce the intensity of pain associated with menstruation, which have many side effects. Therefore, the necessity of providing a non-pharmacological method for patients who do not respond to drug therapy or suffer from the side effects of drugs or those who do not want to use drugs, is quite obvious (29).

Despite the relatively high prevalence of pain associated with menstruation and the existence of effective and useful measures to alleviate its symptoms, a small number of sufferers benefit from them (1). In Iran, this category has been neglected due to insufficient information about the prevalence and pattern of pain related to menstruation among young girls (4). Therefore, contemporary approaches to pain management focus on the use of multidimensional interventions, especially psychological treatments such as meta-cognitive therapy, instead of using only biological treatment approaches. Through changing attention, metacognitive therapy removes maladaptive thinking styles as an obstacle to normal cognitive and emotional processing and increases flexibility in cognitive control. Also, the broken mindfulness technique, which leads to meta-awareness by being aware of internal events without responding to them, is one of the main techniques of this treatment (30).

In fact, this therapeutic approach by presenting special models for each disorder and their experimental evaluation has been widely welcomed, so that despite the short time that has passed since the emergence of this approach, many research works in The field of evaluation of the fundamental theory of metacognition and the therapeutic techniques arising from it has been done (30). On the other hand, the approach has unique features such as its emphasis on the presence of the mind and moment-to-moment awareness of internal events, without getting involved in them, which is influenced by Eastern philosophy, in addition to emphasizing the thinking process, about thinking and elements Like hyperawareness and superstition, it is similar to many concepts emphasized in Iranian culture, and this issue can make it easy to implement the techniques related to this approach for Iranian clients. Therefore, acknowledging the stated content and the importance of students, especially female students with premenstrual syndrome, the prevalence of painful menstruation and its many effects, unwillingness to use drug treatments, little research background in the field of psychological interventions. Effective and the existing research gap, this study was conducted with the aim of investigating the effectiveness of metacognitive therapy on anxiety sensitivity, psychological distress and pain indicators in premenstrual syndrome sufferers.

Research method:

The present study was a semi-experimental study with a pre-post-test design with a control group and a 2-month follow-up period. The research community consisted of all female students suffering from premenstrual syndrome studying in the faculty of educational sciences and psychology of Islamic Azad University, Kermanshah branch in the year 2021, and 30 of them were selected as available.

The sample size was selected according to the type of research. In this research, in addition to the Fleiss equation, G*Power software was used to determine the sample size. This software showed that to achieve a statistical power of 0.90 with an effect size of 0.8 at a significance level of 0.05, at least 15 subjects are needed in each group (31). Therefore, in this study, a standard sample size of 15 people was considered in each group. Also, based on the Fleiss equation, $\sigma=1.61$ (standard deviation of anxiety sensitivity in the post-test of the experimental group), $2d=4.507$, $\text{Power}=0.90$ and $\alpha=0.05$ were considered.

In the mentioned equation, σ is the standard deviation, which is the amount of dispersion, and d is the confidence interval, which shows the degree of negligibility of the sample mean being higher or lower than the population mean.

Based on the equation, the sample size was 12.07. Therefore, in this study, 30 subjects were selected to be sure, and they were randomly divided into two equal groups of 15, with odd numbers for the experimental group and even numbers for the control group.

$$n = \frac{2\sigma^2(z_{1-\frac{\alpha}{2}} + z_{1-\beta})^2}{d^2} = \frac{2(1/61)^2(1/96 + 1/28)^2}{4/507} = 12/07$$

The criteria for entering the study include being a single student, giving informed consent to participate in the research, having regular menstrual cycles, experiencing pain in the 4-5 days before menstruation in three consecutive cycles or more, and obtaining a score of 2 or 3. (Pain with moderate to severe intensity) was on the verbal multidimensional scale of pain.

Having a history of any type of genital and pelvic surgery, suffering from any of the problems with symptoms similar to PMS, such as (migraine disorder, fibromyalgia, chronic fatigue syndrome, endometriosis, severe depression and hormonal problems), experiencing grief or loss (death of loved ones) or emotional relationships) during the last 6 months, having strict and low-calorie diets and missing more than one session from participating in therapy sessions were considered as criteria for exiting the research.

After selecting the participants in order to comply with ethical considerations, the subjects were given brief information about the purpose of the research; they were assured that the results of the research will be published as a general conclusion and not an individual one. They have full authority not to participate in the research or to withdraw from participating in the research at any stage, and the written consent of the subjects was obtained. The initial form of the questionnaires was completed by both groups within 7 to 10 days before the period, and then for the experimental group of metacognitive therapy, it was implemented for 10 sessions of 90 minutes in the form of weekly sessions, and an arrangement was made that during the implementation period independent variable to the experimental group, no treatment is done on the control group. After the end of the treatment sessions, the post-test was done immediately and the follow-up was done 2 months after the post-test with self-report questionnaires. The summary of the content of the treatment sessions is presented in Table No. 1. The following tools were used in this study:

Premenstrual symptoms screening questionnaire: This self-report questionnaire was prepared and compiled by Steiner, McDougall and Brown (32) in order to measure pain related to menstruation. This tool includes 19 questions and 2 subscales of premenstrual symptoms: mood, physical and behavioral symptoms with questions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14; Interference with functioning; or the impact of symptoms on life with questions 15, 16, 17, 18 and 19. The scoring of the questionnaire is done on a 4-point Likert scale, in which a score of 0 is given to no score, a score of 1 to mild, a score of 2 to moderate, and a score of 3 to severe. Higher scores indicate that the person has premenstrual syndrome. The cut-off point of the questionnaire is 28 and above. In Iran, the internal consistency method was used to check the reliability of the

questionnaire, and Cronbach's alpha was 0.90 and content validity was 0.70 to 0.80 (33). In this study, the reliability of the questionnaire was obtained with Cronbach's alpha coefficient of 0.78.

Anxiety sensitivity questionnaire: In order to measure anxiety sensitivity, the scale of Floyd, Garfield and Lasota (34) was used. This scale has 16 questions and is calculated based on a 5-point Likert scale (very low score of 0 to very high score of 4). Each question reflects the belief that anxious feelings are experienced unpleasantly and have the potential to lead to a traumatic outcome. The degree of experiencing fear of anxiety symptoms is determined by higher scores. The range of scores is between 0 and 64. The structure of this scale consists of three factors: fear of worries, fear of not having cognitive control, and fear of being observed by others. Examining the psychometric properties of this scale has shown its internal stability (alpha between 0.80 and 0.90). The retest reliability after two weeks is 0.75 and for three years it is 0.71. It has been shown that anxiety sensitivity is a stable personality construct. Its reliability in the Iranian sample has been calculated based on three methods of internal consistency, retesting, and halving, and the reliability coefficients of 0.93, 0.95, and 0.97 have been obtained for the entire scale, and the correlation between the subscales is between 0.40 to 0.68 (35). In this study, the reliability of the questionnaire was obtained with Cronbach's alpha coefficient of 0.75.

Depression, anxiety and stress questionnaire: This questionnaire was created by Loibond and Loibond (36) to measure mental helplessness and determine the state of three stress, depression and anxiety. It has 21 questions. The subject must indicate the state of a symptom during the past week. In this questionnaire, questions 1, 6, 8, 11, 12, 14 and 18 are related to stress, questions 2, 4, 7, 9, 15, 19 and 20 are related to anxiety and questions 3, 5, 10, 13, 16, 17 and 21 are related to depression. Answering the questions of the questionnaire is given on a four-point Likert scale, including not at all = 0 points, little = 1 point, a lot = 2 points, and a lot = 3 points. The classification of depression scores is normal (0-9), mild (10-13), moderate (14-20), severe (21-27), and very severe (28). The classification of anxiety scores is normal (0-7), mild (8-9), moderate (10-14), severe (15-19) and very severe (20). The classification of stress scores is normal (0-14), mild (15-18), moderate (19-25), severe (26-33) and very severe (33). In the study abroad, Cronbach's alpha coefficient was used to check the reliability of the questionnaire and the reliability of the questionnaire was 0.88 (37). Within the country, the Cronbach's alpha value of the stress, anxiety and depression subscales was 0.79, 0.80 and 0.81, respectively, and the total Cronbach's alpha coefficient was 0.91 (38). In this study, the reliability of the questionnaire was obtained with Cronbach's alpha coefficient of 0.75 and for the subscales, respectively, 0.75, 0.78 and 0.78.

McGill pain questionnaire: The McGill Pain Intensity Questionnaire (39) is one of the best tools for measuring pain, which has 20 sets of expressions to evaluate pain, and its purpose is to measure people's understanding of pain and its various dimensions. This questionnaire has 4 sensory dimensions (sets 1 to 10), emotional dimension (sets 5 to 15), pain assessment dimension (15-17) and various pains (sets 17 to 20). The scoring of the questionnaire is from A to C. The higher the score, the greater the pain intensity. McGill (39) reported the reliability and validity of the questionnaire with Cronbach's alpha method of 0.87. In domestic research, the reliability of the questionnaire was obtained with the method of Cronbach's alpha coefficient of 0.84 (40). In this study, the reliability of the questionnaire was obtained with Cronbach's alpha coefficient of 0.81.

Pain acceptance questionnaire: This questionnaire was prepared by McCracken, Wools and Eccleston (41) to measure pain acceptance and has been widely used in studies related to chronic pain. This tool consists of 20 questions, each of which is scored on a 5-point scale from never (1 point) to always (5 points). Chronic pain acceptance questionnaire includes two subscales. A- Involvement in activities (i.e., pursuing daily activities despite pain) and B- acceptance of pain (i.e., relative absence of efforts to avoid or control pain). Cronbach's alpha coefficient of its two subscales for engagement and acceptance are reported as 0.79 and 0.75, respectively. In the pilot study, the internal reliability of this scale with Cronbach's alpha coefficient was 0.74 (42). In this study, the reliability of the questionnaire was obtained with Cronbach's alpha coefficient of 0.74.

Summary of metacognitive therapy sessions

Table No. 1- Summary of the content of Wells metacognitive intervention sessions (43)

Meetings	Content of the intervention program
First and second	Introduction, conceptualizing the problem or disease, inducing the metacognitive style, preparing the group to start the treatment, performing the suppression experiment with thought.
Third	Formulation for patients, introduction of model and preparation, implementation of thought suppression experiment, initiation of challenge with belief related to uncontrollability, practice of broken mindfulness, introduction of postponing worry, homework.
Fourth	Review homework, continue preparation if needed, re-document verbal and behavioral-uncontrollable homework.
Fifth	Reviewing homework, continuing to challenge the uncontrollable belief, providing counter-evidence), explaining about chronic pain, signs and methods of coping with pain symptoms, performing the loss of control test in the treatment session, checking and stopping maladaptive control. And avoidance behaviors, homework.
Sixth and seventh	Homework review, continuing the challenge with automatic beliefs related to anxiety sensitivity and stressors, starting the challenge with beliefs related to pain and barriers to its control, trying to lose control or self-harm through sensitivity testing and anxiety-provoking worry, teaching methods of dealing with anxiety-provoking thoughts and emotions related to menstrual pain, homework.
Eighth and ninth	Homework review, continuing the challenge with anxious thoughts and beliefs, emphasizing reversing any remaining maladaptive strategies, starting the challenge with positive beliefs, acceptance and mindfulness practices in the face of pain symptoms, homework.
Tenth	Asking the subjects to write a treatment summary sheet, work on the program to prevent the attack of anxiety symptoms and the distress caused by it, strengthen and teach the alternative program and clear explanation with

examples to deal with anxiety and negative emotions caused by experiencing chronic pain, ready Getting people to end sessions, run post-tests.

The process of conducting the research was as follows: first, female students with menstrual pain were invited to participate in the research. During this call, 96 people came to the counseling center of Islamic Azad University, Kermanshah branch. Among these people, in order to diagnose premenstrual syndrome, they were evaluated and interviewed by a psychologist and asked to fill out the premenstrual symptoms screening questionnaire 7 or 10 days before the period. Then, among these people, 62 people were diagnosed with premenstrual syndrome according to the clinical interview and the acquired score in the self-report. It should be noted that because the score from self-reporting tools can be associated with bias, for the final diagnosis, the results of the self-reporting tool were calculated and referred to the women who were coordinated with him afterwards, who were finalized in the final diagnosis. 44 people received a definitive diagnosis of premenstrual syndrome. Among these 30 people willing to cooperate were randomly divided into two equal groups of 15 experimental and 15 control. In this research, the collected data were analyzed by SPSS software version 26 and using the Kolmogorov-Smirnov, Mbox, Mochli and Levin test and two-way analysis of variance with repeated measurements.

Results:

It should be noted that none of the participants were excluded from the study during the implementation of the intervention. The demographic data of the subjects showed that the average age in the experimental group was 28.09 ± 6.07 years and in the control group, it was 28.14 ± 5.83 years. There was no statistically significant difference between the research groups in terms of education level, socio-economic status and duration of menstrual pain experience (7 to 10 days before the onset of symptoms according to the questionnaire and gynecologist's opinion) ($P < 0.05$).

Table No. 2 - Descriptive data of research variables by group and assessment stages

group	Number	Research variable	pre-test	Post- test	Follow-up
			M $\pm$ SD	M $\pm$ SD	M $\pm$ SD
examination	15 people	intensity of pain	15/00 $\pm$ 0/90	12/87 $\pm$ 0/84	12/80 $\pm$ 1/01
control	15 people		$\pm$ 1/34 14/85	$\pm$ 1/41 14/93	$\pm$ 1/44 14/96
examination	15 people	acceptance of pain	18/19 $\pm$ 3/64	12/00 $\pm$ 1/77	12/04 $\pm$ 1/51
control	15 people		$\pm$ 2/59 19/13	$\pm$ 3/11 19/47	$\pm$ 3/10 19/43
examination	15 people	Anxiety sensitivity	29/08 $\pm$ 5/34	21/62 $\pm$ 3/37	21/40 $\pm$ 3/60
control	15 people		$\pm$ 4/12 28/60	$\pm$ 4/44 28/77	$\pm$ 4/31 28/70
examination	15 people	depression	16/43 $\pm$ 4/59	11/76 $\pm$ 2/20	11/70 $\pm$ 2/18

control	15 people		$\pm 3/54$ 17/10	$\pm 2/56$ 17/23	$\pm 2/55$ 17/21
examination	15 people	anxiety	19/00 $\pm$ 3/08	14/27 $\pm$ 2/12	12/21 $\pm$ 2/08
control	15 people		$\pm 3/14$ 18/33	$\pm 3/12$ 18/29	$\pm 3/17$ 18/31
examination	15 people	Stress	14/58 $\pm$ 2/36	10/33 $\pm$ 0/89	10/27 $\pm$ 0/93
control	15 people		$\pm 2/23$ 14/47	$\pm 2/36$ 14/53	$\pm 2/40$ 14/62
examination	15 people	mental distress	15/01 $\pm$ 10/03	36/36 $\pm$ 5/21	36/18 $\pm$ 5/19
control	15 people		$\pm 8/91$ 49/09	$\pm 8/04$ 50/05	$\pm 8/12$ 50/14

Table 2 shows the mean and standard deviation of psychological constructs (anxiety sensitivity and psychological distress) and pain indices (acceptance and intensity) in the groups participating in the research at different stages of measurement. . The results show that the average score of anxiety sensitivity, psychological distress and each of its dimensions in the post-test and follow-up phases in the experimental groups have decreased compared to the control group. Also, the results showed an improvement in the average score of pain intensity and acceptance indicators in the test groups in the post-test and follow-up stages.

In examining the assumptions of the two-way analysis of variance test with repeated measurements, the Kolmogorov-Smirnov test showed that the assumption of normality of the distribution of the study variables was fulfilled, because the calculated z values were not significant at the $p < 0.05$ level. In Mbox test, anxiety sensitivity variables ($F = 1.404$), depression ($F = 0.689$), anxiety ($F = 1.376$), stress ($F = 1.903$), pain intensity ($F = 23.222$) F and acceptance ($F = 0.865$) were not significant at the level of 0.319, 0.241, 0.351, 0.601, 0.277 and 0.399, respectively.

Therefore, it can be said that the assumption of homogeneity of the variance-covariance matrix for the variables is established. Also, the results of Levin's test to check the equality of error variance in the pre-test, post-test and follow-up showed that due to the non-significance of the F value of the variables at the error level of 0.05, the error variance of the research variable in the pre-test, post-test and follow-up are equal, and for this reason, the assumption of equality of error variances is also established.

The hypothesis of multiple correlations of dependent variables was checked with Mochli's test of sphericity. The results showed that Mochli's assumption of sphericity is not valid in pain intensity and depression. Therefore, due to the violation of this presupposition, in this situation, the Greenhouse-Geisser test is more conservative than the other two options. Therefore, and according to the other preconditions examined in the previous step, all the assumptions necessary to perform

the two-way variance analysis test with repeated measurements are in place. Therefore, in the following, this statistic is used to interpret the results of the within-subjects effects tests.

Table 3 - Results of analysis of variance of repeated measurement of research variables in three stages of implementation

Research variable	sources of changes	F	P-Value	Eta
intensity of pain acceptance of pain	Group	5/94	0/022	0/43
	Time	10/47	0/016	0/48
	Group * time	6/18	0/009	0/54
Anxiety sensitivity	Group	9/13	0/003	0/60
	Time	5/16	0/007	0/57
	Group * time	10/70	0/014	0/62
depression anxiety	Group	6/00	0/011	0/64
	Time	21/73	0/019	0/71
	Group * time	17/75	0/005	0/61
Stress	Group	4/569	0/001	0/580
	Time	2/234	0/001	0/613
	Group * time	10/339	0/001	0/674
mental distress intensity of pain	Group	9/318	0/001	0/692
	Time	۱۲/۷۹۱	0/001	0/620
	Group * time	۱۵/۲۳۸	0/001	0/633
acceptance of pain	Group	3/850	0/001	0/560
	Time	8/765	0/001	0/614
	Group * time	20/598	0/001	0/619
Anxiety sensitivity	Group	31/108	0/001	0/526
	Time	91/633	0/001	0/766
	Group * time	43/456	0/001	0/608

*Results are presented based on the Greenhouse-Geisser correction; *P<0.05

The results of Table 3 show that regarding the total score of anxiety sensitivity, pain indices, psychological distress and each of its dimensions (depression, anxiety and stress), all three intergroup, intragroup and interactive effects Intergroup-intragroup is significant. The comparison of averages shows that in the post-test and follow-up stages, the intervention groups have obtained better scores in the dependent variables of the study, and the effect size on the total score of anxiety sensitivity is 0.61, pain intensity is 0.54., acceptance of pain 0.62, psychological distress 0.60 and each of its dimensions including depression 0.67, anxiety 0.63 and stress 0.61%. The effect of metacognitive therapy on the dependent variables of the research has been maintained after two months of follow-up (P<0.05). The general result shows that metacognitive therapy has been effective (beneficial) on the research variables.

Discussion and conclusion:

This research was conducted with the aim of investigating the effectiveness of metacognitive therapy on anxiety sensitivity, psychological distress and pain indicators (acceptance and intensity) in female students with premenstrual syndrome. The results of the research showed that metacognitive therapy was effective in improving the psychological state (anxiety sensitivity and psychological distress) of PMS sufferers in the post-test phase and this effectiveness was maintained in the two-month follow-up period.

The results of the present study based on the usefulness of metacognitive therapy on the psychological status of premenstrual syndrome sufferers with the findings of Regiuro et al. The case of improvement of anxiety sensitivity score and test anxiety symptoms, Setreg, Kazemi and Raisi (44) regarding the effect of metacognitive therapy on reducing the psychological problems of drug abusers, Wells, Rios, Capobianco, Hayal, Davids, Haggerty et al. (45) regarding improvement depression and anxiety symptoms of cardiovascular patients, and Kainer, Solm, Hong, Havinen, Neister and Hejmedal (46) agree about the improvement of mood, anxiety and personality related problems in anxiety patients.

Anxiety and depression are unpleasant emotional experiences that are a sign of the presence of threats or loss. Anxiety is especially an unpleasant and vague negative feeling with symptoms such as worry (47). When people respond to them by changing the pattern of attention and thinking, they become stable and problematic. However, most people are unable to realize that their attention is locked on themselves and their thoughts and feelings, and this process increases and perpetuates negative feelings and beliefs about themselves. Therefore, it can be said that in metacognitive therapy, using dissociative mindfulness techniques, postponing worry, and especially the situational technique of attention, which is used to deal with mental tensions in people suffering from menstrual pain, and it increases the level of arousal, it may be effective in reducing anxiety and depression.

Another possible explanation for reducing psychological distress and anxiety sensitivity of premenstrual syndrome sufferers is the use of profit and loss analysis. So that the therapist tried to make the subjects realize that worrying and thinking has little result and only plays a role in getting him trapped in repeating the negative aspects of stressful events or thinking about future threats. With this aim and in order to weaken the positive beliefs about the need to engage in these stable thinking patterns, the therapist leads the clients towards analyzing the benefits and harms of worry and thinking. The goal is to weaken gains and highlight losses to facilitate the use of worry and thoughtfulness. According to this view, disturbing thoughts are considered in a disconnected manner without being analyzed or interpreted or controlled. When the patient or the subject understands the concept of broken mindfulness and it is practiced in the treatment session, the therapist introduces the strategy of postponing worry and thinking. The therapist taught the subjects that whenever they experience disturbing thoughts or symptoms of depression and anxiety, they should be aware of their occurrence and tell themselves that now do not think about the traumatic and stressful event, do not worry and the symptoms will disappear. Don't overanalyze, just let the symptoms go away in their own time. Probably, people with high anxiety

sensitivity try to hide their emotional states, negative thoughts and feelings and show low emotional expressions. Avoiding experiencing emotions paradoxically increases people's negative thoughts, feelings and emotions. With psychological interventions, appropriate emotional expressions are created, as a result, people experience less anxiety. Therefore, the reduction of anxiety sensitivity will subsequently reduce the amount of anxiety and psychological distress of menstrual pain sufferers.

In the current explanation of the effectiveness of metacognitive therapy on mental distress and anxiety sensitivity, it can be said in general that this therapeutic approach first requires people to identify the important areas that they want from among psychological and emotional processes. to make that change, specify it, and then metacognitive therapy focuses on these areas during the sessions. For each of these areas, assignments and exercises are designed based on the techniques and principles of treatment to be implemented inside and outside the meetings. Therefore, by introducing distress and sensitivity to anxiety as an area in which they want to change, those suffering from menstrual pain learn the ways and principles that lead to reducing their psychological distress. As one of the principles of this therapeutic approach is the development of psychological and social interactions. Improving these interactions will lead to higher perception of control and increasing coping skills in an efficient and consistent manner.

Another finding of the research, consistent with the results of previous studies, showed that metacognitive therapy was effective in improving pain indicators (intensity and acceptance of pain) in the post-test and follow-up stages. In line with this finding, Vosali and Neshat Doust (48) showed that metacognitive therapy has a positive effect on reducing the pain intensity of chronic pain sufferers. Mustafaei, Zare, Alipour and Farzad (49) also reached the conclusion that both metacognitive therapy approaches and cognitive therapy based on the transtheoretical model were effective in patients with chronic pain on the perception of thought control and improvement of pain symptoms. Are Rewari, Naderi, Makundi and Hafezi (50) also showed that metacognitive therapy was effective in improving the quality of life and reducing the average score of pain catastrophizing in patients with chronic pain.

In explaining these findings, it can be acknowledged that psychological interventions are beneficial for many subjects with premenstrual syndrome, especially when these interventions increase physical activity levels. Psychological and medical consequences are influenced by people's beliefs about symptoms, causes, effects and consequences, duration, control or treatment of their diseases. Also, this result can be explained as learning a new and appropriate behavior to deal with pain creates a feeling of mastery and empowerment in people. Also, it seems that the mechanism responsible for the success of metacognitive therapy is the hypothesized mechanism for therapeutic change, harmonizing a person's belief system more closely with the reality of his life so that he accepts the responsibility of life and the desired changes in it. Therefore, the client's role in accepting the possibility of change by himself is the goal of metacognitive therapy. The therapeutic application of this explanatory model is to give more importance to the modification of the individual's belief system and motivation, not to ask him to avoid stressful situations in his personal and social life, because many situations are inevitable.

In explaining this finding, it can also be said that the modification of thoughts and interpretations cause relaxation, and on the other hand, exercises derived from this approach, such as mindfulness and cognitive impairment, cause the tension and activity of the sympathetic system or anxiety response. Reduce stress, as a result, the physical symptoms associated with the sympathetic system are alleviated and less pain is perceived and reported. In fact, through the techniques of this intervention method, people were taught to control the symptoms related to pain by identifying the provoking factors. Therefore, by increasing the sense of control over symptoms and reducing the occurrence of symptoms and attacks, the intensity of their perceived pain has also improved.

Research limitations:

The voluntary nature of the participants may affect the results of the statistical analysis and thus have adverse effects on the internal validity of the research. Therefore, in generalizing and relying on the research results, this limitation should be considered somehow. It is obvious that by conducting repeated researches and confirming the findings, this limitation will disappear in practice. Another limitation is that the statistical population of the study was made up of female students of Kermanshah city, and therefore the generalization of the results of this study to other societies should be done with caution. It is suggested to compare the effectiveness of this intervention method with other approaches, especially in different cities of Iran, and evaluate the effect of this treatment approach on other variables of this population with menstrual pain. The information obtained from this study will be useful for therapists in order to improve the mental state and reduce problems related to the pain of women and young girls. The results of this study can also be used in family counseling centers, mental health service centers, and women's service centers.

Conflict of interest:

No conflicts of interest with the rights of the authors have been stated.

Ethical considerations:

Explaining to the research participants that there is no risk for them to participate in the research. A complete and useful explanation was given to the participants about how to respond to the research tools, obtaining informed consent from them, the optionality of the research, and the confidentiality of the information. Also, during the performance, it was announced to the participants that as a thank you for their cooperation in the research, those who wish to be informed about the results of their test, can be informed about the results of this study.

Application of research:

Considering the prevalence of painful menstruation and its many effects, as well as considering the effectiveness of metacognitive therapy and its effective role in reducing psychosocial harms, the results of this study can be of interest to psychologists, counselors, programs. It should be placed in the field of mental health, institutions and organizations that work with women and their issues, and have practical uses and educational-therapeutic implications.

References:

1. Kwon YJ, Sung DI, Lee JW. Association among Premenstrual Syndrome, Dietary Patterns, and Adherence to Mediterranean Diet. *Nutrients*. 2022;14(12):2-11.
2. Mu J, Wang Q, Dun W, Yang J, Wang K, Zhang M. The effects of long-term menstrual pain on pain empathy in women with primary dysmenorrhea. *Journal of Pain*. 2021;162(7):2051-2059.
3. Kim SS, Kim HS. Dysmenorrhea in High School Girls and Its influencing Factors. *Journal of the Korea Convergence Society*. 2021;12(3):409-420.
4. Farshbaf Manei Sefat F, Abolghasemi A, Barahmand U, Hajloo N. A Survey of Menstruation Pattern and Prevalence of Dysmenorrhea in Ardabil Second High School Students. *irje*. 2017; 13(3):235-243.
5. Ferries-Rowe E, Corey E, Archer JS. Primary dysmenorrhea: diagnosis and therapy. *Obstetrics & Gynecology*. 2020;136(5):1047-1058.
6. Shabani M, Khalatbari J. The effectiveness of mindfulness-based stress reduction training on emotion regulation difficulties and psychological well-being in premenstrual syndrome. *Health Psychology*, 2019;8(1):134-152.
7. Azagew AW, Kassie DG, Walle TA. Prevalence of primary dysmenorrhea, its intensity, impact and associated factors among female students at Gondar town preparatory school, Northwest Ethiopia. *BMC women's health*. 2020;20(1):1-7.
8. Paulus DJ, Capron DW, Zvolensky MJ. Understanding hazardous drinking and suicidal ideation and suicide risk among college students: anxiety sensitivity as an explanatory factor. *Cognitive behaviour therapy*. 2021;50(5):378-394.
9. Baradaran M. The Mediating Role of Cognitive Emotion Regulation Strategies and Defense Mechanisms in the Relationship between Perfectionism and Anxiety Sensitivity in Cosmetic Surgery Applicants Students. *quarterly journal of health psychology*. 2020;9(34):57-74.
10. Warren AM, Zolfaghari K, Fresnedo M, Bennett M, Pogue J, Waddimba A. Anxiety sensitivity, COVID-19 fear, and mental health: results from a United States population sample. *Cognitive Behaviour Therapy*. 2021;50(3):204-216.
11. Angehrn A, Krakauer RL, Carleton RN. The impact of intolerance of uncertainty and anxiety sensitivity on mental health among public safety personnel: When the uncertain is unavoidable. *Cognitive Therapy and Research*. 2020;44(5):919-930.
12. Çaltekin İ, Hamamcı M, Demir Çaltekin M, Onat T. Evaluation of sleep disorders, anxiety and depression in women with dysmenorrhea. *Sleep and Biological Rhythms*. 2021;19(1):13-21.
13. Fereydoni F, Sabet M. The Effect of Solution-Focused Brief Psychotherapy on Distress Tolerance, Decision-Making Styles and Social Adjustment in MS Patients of Sari City. *Journal of Consulting Excellence and Psychotherapy: Issue*. 2021; 10:36-47.
14. Shahbahrani M, Mohammad khani S, Akbari M. The Diagnostic Role of Distress Tolerance, Metacognition, Sensation Seeking, and Perceived Social Disorganization in Methamphetamine, Opium, and Alcohol users. *etiadjpajohi*. 2021;15 (60):325-350.

15. Ali Akbari Dehkordi M, Bitaneh M. The Effectiveness of Psychological Capital Elements Training on Psychological Flexibility and Psychological Distress on the Women with Breast Cancer. *Quarterly J Health Psychology*. 2021;10(38): 7-22.
16. Setayeshi M, Mirzahosseini H, Mohebbi M. The Relationship of Perceived Support with Addiction Potential and Psychological Distress with the Mediating Role of Loneliness in School Students. *etiadpajohi*. 2018;12(46):157-172.
17. Vaziri S, Shaydani Aghdam S, Noobakht L, Khalili M, Vaziri Y,. Comparison of physical symptoms in people with low and high psychological distress Patients Disease. *J Thought & Behavior in Clinical Psychology*. 2018;13(49):57-66.
18. Satici B, Gocet-Tekin E, Deniz M, Satici SA. Adaptation of the Fear of COVID-19 Scale: Its association with psychological distress and life satisfaction in Turkey. *International journal of mental health and addiction*. 2021;19(6):1980-1988.
19. Hu Z, Tang L, Chen L, Kaminga AC, Xu H. Prevalence and risk factors associated with primary dysmenorrhea among Chinese female university students: a cross-sectional study. *J pediatric and adolescent gynecology*. 2020;33(1):15-22.
20. Kim HS. Factors Affecting Perceived Stress, Depression and Sleep Disturbance on the Dysmenorrhea among Female University Students. *J the Korean Applied Science and Technology*. 2021;38(2):399-410.
21. Kabukçu C, Başay BK, Başay Ö. Primary dysmenorrhea in adolescents: association with attention deficit hyperactivity disorder and psychological symptoms. *Taiwanese Journal of Obstetrics and Gynecology*. 2021;60(2):311-317.
22. Quan S, Yang J, Dun W, Wang K, Liu H, Liu J. Prediction of pain intensity with uterine morphological features and brain microstructural and functional properties in women with primary dysmenorrhea. *Brain Imaging and Behavior*. 2021;15(3):1580-1588.
23. Pan YY, Jin SH, Luo S, Li RR, Tu YY, Jin D, Dysmenorrhea is associated with a higher incidence of pain after diagnostic hysteroscopy or treatment. *Signa Vitae*. 2021;17(2):63-66.
24. Vlachos D, Lagattuta C. Is osteopathic manipulative treatment effective in reducing primary dysmenorrhea? *Evidence-Based Practice*. 2021;24(8):43-44.
25. Rickardsson J, Gentili C, Holmström L, Zetterqvist V, Andersson E, Persson J, & et al. Internet-delivered acceptance and commitment therapy as microlearning for chronic pain: A randomized controlled trial with 1-year follow-up. *European J Pain*. 2021;25(5):1012-1030.
26. Farhangi A. Effectiveness of Mindfulness Based Cognitive Therapy Chronic Pain Management on Psycho-Social Function in Women with Breast Cancer. *J Excellence in Counseling and Psychotherapy*. 2019;8(2):11-28.
27. Mannes ZL, Ferguson EG, Ennis N, Hasin DS, Cottler LB. Pain Acceptance Among Retired National Football League Athletes: Implications for Clinical Intervention. *J Clinical Sport Psychology*. 2021;1(1):1-4.
28. Ysidron DW, Slepian PM, Ankawi B, Himawan LK, France CR. Pain Acceptance Partially Mediates the Relationship Between Perceived Injustice and Pain Outcomes Over 3 Months. *The Clinical J Pain*. 2020;36(11):868-873.

29. Gardner BR, Rourke NL. Multimodal analgesia in a Southern White Rhinoceros (*Ceratotherium simum*) with pentosan polysulfate, gabapentin, amantadine and phenylbutazone to manage chronic pain. *Australian veterinary journal*. 2021;99(3):86-88.
30. Requero B, Briñol P, Petty RE. The impact of hope and hopelessness on evaluation: A meta-cognitive approach. *European Journal of Social Psychology*. 2021;51(2):222-238.
31. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav Res Methods* 2009;41(4):1149-1160.
32. Steiner M, Macdougall M, Brown E. The premenstrual symptoms screening tool (PSST) for clinicians. *Archives of Women's Mental Health*. 2003;6(3):203-209.
33. Saghebi Saeedi K, Abolghasemi A, Akbari B. The role of sense of coherence, alexithymia and self-compassion in predicting psychological well-being in girl with primary dysmenorrhea. *Razi J Med Sci*. 2018;25(8):33-42.
34. Floyd M, Garfield A, LaSota MT. Anxiety sensitivity and worry. *Personality and Individual Differences*. 2005;38(5):1223-1229.
35. Afshari A, Hashemi Z. The relationship between anxiety sensitivity and metacognitive beliefs and test anxiety among students. *J school psychology*. 2019;8(1):7-25.
36. Lovibond PF, Lovibond SH. The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour research and therapy*. 1995;33(3):335-343.
37. Park SH, Song YJ, Demetriou EA, Pepper KL, Thomas EE, Hickie IB, & et al. Validation of the 21-item Depression, Anxiety, and Stress Scales (DASS-21) in individuals with autism spectrum disorder. *Psychiatry Research*. 2020; 291:113300.
38. Tehrani S S, ghalandarzadeh Z, Farahani H, Saberi S M, Pashaei Bahram M. The Mediating Role of the self-regulation and psychological Distress in the relationship between domestic violence and cognitive functions in women victim of spouse abuse. *Journal of Cognitive Psychology*. 2018;6(3): 51-60.
39. McGill, S. *Low Back Disorders: Evidence based Prevention and Rehabilitation*. 2008.
40. Jafari A, Shiralizadeh S. The Predicting of Pain based on Emotional Expression in Women with Breast cancer in Pandemic COVID-19: mediating role of life Style. *IJCA*. 2021; 2(2):13-23
41. McCracken LM, Vowles KE, Eccleston C. Acceptance of chronic pain: component analysis and a revised assessment method. *Pain*. 2004;107(1-2):159-166.
42. Anvari MH, Ebrahimi A, Neshatdoost HT, Afshar H, Abedi A. The Effectiveness of Group-Based Acceptance and Commitment Therapy on Pain-Related Anxiety, Acceptance of Pain and Pain Intensity in Patients with Chronic Pain. *J Isfahan Med Sch*; 32(295): 1156-65.
43. Wells A. Cognition about cognition: Metacognitive therapy and change in generalized anxiety disorder and social phobia. *Cognitive and Behavioral Practice*. 2007;14(1):18-25.
44. Setorg S, Kazemi H, Raisi Z. Effectiveness of meta-cognitive therapy on craving beliefs and substance-related beliefs in substance abuse disorder patients. *etiadjpajohi*. 2014; 7(28):147-162.

45. Wells A, Reeves D, Capobianco L, Heal C, Davies L, Heagerty A, & et al. Improving the Effectiveness of Psychological Interventions for Depression and Anxiety in Cardiac Rehabilitation: PATHWAY—A Single-Blind, Parallel, Randomized, Controlled Trial of Group Metacognitive Therapy. *Circulation*. 2021;144(1):23-33.
46. Kennair LE, Solem S, Hagen R, Havnen A, Nysæter TE, Hjemdal O. Change in personality traits and facets (revised NEO personality inventory) following metacognitive therapy or cognitive behaviour therapy for generalized anxiety disorder: results from a randomized controlled trial. *Clinical Psychology & Psychotherapy*. 2021;28(4):872-881.
47. ShomaliAhmadabadi M, Poorjanebollahi M, Behjat A, BarkhordariAhmadabadi A. The Role of Experiential Avoidance and Professional Assistance Orientation in Predicting Covid Anxiety-19. *J Consulting Excellence and Psychotherapy: Issue*. 2021;9(36):67-78.
48. Vesal M, Taher Neshatdoost H. Meta-analysis of psychological intervention's effectiveness on reduction of pain intensity among patients with chronic pain. *JAP*. 2019;10(3):21-38.
49. Mostafaie A, Zare H, Alipour A, Farzad V. Appraisal of Effectiveness and Comparison of Cognitive Therapy Based on Meta-Theoretical Models and Meta-Cognitive Therapy on Thought Control and Reducing the Pain in Patients Suffering from Chronic Pain. *J Clinical Psychology*. 2017;2(34): 1-8.
50. Yadavari M, Naderi F, Makvandi B, Hafezi F. The Effects of Metacognitive Therapy on Pain Catastrophizing and Quality of Life in Patients with Chronic Pain. *MEJDS*. 2020;10 :134-135