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HEALTH PSYCHOLOGY | RESEARCH ARTICLE

Comparing the effectiveness of relaxation by hypnotherapy and virtual reality technology in alleviation of the symptoms of premenstrual syndrome

Sousan Heydarpour¹ and Fateme Dehghan^{1*}

Abstract: Objective: Premenstrual syndrome (PMS) is a mental, neural, and glandular disorder and triggers changes in personal and behavioral characteristics. It affects considerably one's ability to work and perform daily tasks. The effects of relaxation using hypnotherapy and virtual reality (VR) technology on alleviation of the symptoms of PMS were examined. Methods: A clinical trial with control group was carried out in the academic year 2017–18 in the dormitories of Kermanshah University of Medical Sciences. The participants were 90 girl students randomly grouped into three groups of hypnotherapy ($n = 30$), VR ($n = 30$), and control ($n = 30$). The data gathering tools were a demographics form and postmenstrual screening tool. The relaxation program using VR and hypnotism was implemented in three sessions in the experiment groups. Three months after the last session, the participants filled out the tools once more (posttest). The collected data were analyzed using paired t-test, ANOVA, and Tukey's post hoc test. Results: The results of ANOVA showed that there was no significant difference in the control group before and after the intervention in terms of PMS ($P > 0.05$). This difference was significant in the experiment groups ($P < 0.5$). Conclusions: Relaxation using VR technology and hypnotism in the girls with PMS alleviated the symptoms.

Subjects: Health Conditions; Midwifery; Public Health Policy and Practice

ABOUT THE AUTHOR

The authors of this article have been working on Department of Midwifery, Nursing and Midwifery Faculty in Kermanshah University of Medical Sciences, Iran. Dr. Sousan Heydarpour is an assistant Professor in Nursing and Midwifery school working with Fateme Dehghan, examine a wide array of issues in reproductive health in Kermanshah University of Medical Sciences, Iran. The goal of this work is to alleviate the symptoms of PMS. PMS is a very important issue for future research of our team. Mrs Fateme Dehghan is a nonresident researcher in Kermanshah University of Medical Sciences and a PhD student in Razi University. She has published some papers in Persian in the field of psychology.

PUBLIC INTEREST STATEMENT

One of the psychosomatic issues of the reproduction function in women is premenstrual syndrome (PMS). Women with PMS face mental, neural, and glandular disorder. It affects considerably one's ability to work and perform daily tasks. This feasibility study aimed to compare the effectiveness of relaxation by hypnotherapy and virtual reality technology in alleviation of the symptoms of PMS. We found relaxation using virtual reality technology and hypnotism in the girls with PMS alleviated the symptoms. It is important that more studies be conducted on PMS.

| **Keywords:** relaxation; virtual reality technology; hypnotism; premenstrual syndrome

1. Introduction

One of the psychosomatic issues of the reproduction function in women is premenstrual syndrome (PMS) (Babazadeh & Keramat, 2011). It is a set of physical and mental symptoms triggered by menstruation in women (Arbabi, Shirmohammadi, Taghizadeh, & Mehran, 2008). The disorder is categorized as a psychosomatic disease. The main assumption about a psychosomatic pattern is that when an organism is under mental pressure, disease prone condition might appear in an area of the body (Taylor, 2005).

The majority of women experience a range of physical and psychological changes from two weeks to a few days before menstruation (Arbabi et al., 2008). The symptoms include depressed moods, fear, changes in sleep pattern, memory disorders, irritability, anxiety, weight gain, and changes in appetite (Keable, 1997). The symptoms appear at the luteal phase of menstrual cycle and disappear by initiation of menstruation or in early days of menstruation (Hanifi et al., 2011). More than 90% of women demonstrate trivial PMS symptoms during their fertility years and at least one of the symptoms appears on monthly basis. Severity of the symptoms in 2 to 10% of these women is too high so that it affects their family, social, and professional lives (Shabanian et al., 2011). Studies on prevalence of PMS in different countries have shown that Sweden with 10% and Iran with 98.2% have the lowest and highest rates of prevalence respectively (Tschudin, Berteau, & Zemp, 2010).

Farokh Islamlou et al. reported that the prevalence of PMS in students of medical sciences based on ICD-10 and DSM-4 was 79.6 and 39.4%, respectively (Farrokh_eshamlou, Nabilou, Oshnouei, & Akbari, 2013). Rizk, Mosallam, Alyan, and Nagelkerke (2006) showed that the syndrome caused disorder in communications and normal activities, lack of activity, lack of motivation, and a decrease in students' accuracy in doing assignments. When the severity of symptoms is high, the life style, peace, and health of the students might be at risk. As a disease, the syndrome might cause changes in personal and behavioral characteristics of girl students. The effects of behavioral changes on personal and educational performance are considerable like mistreating life partner and children or even committing criminal acts are observed in individuals suffering PMS (Lobbestael, Leurgans, & Arntz, 2011).

Several etiological causes have been introduced to explain the disorders, which in turn have led to different treatment methods to control the clinical symptoms. The reason for proposing the wide range of causes and the intervention methods is the multi-factor nature of the disorder and the role of different biological, mental, and social factors in development of the condition. In addition, the symptoms of PMS overlap with several psychological disorders and female diseases (Jurgens & Whelan, 2009).

Despite the high prevalence of PMS and its considerable symptoms, the actual causes and a reliable treatment have not been found yet and the available treatments are only to control the symptoms (Biggs & Demuth, 2011).

According to Dayapoğlu and Tan (2012), hypnotism treatment can attenuate the stress caused by the syndrome and remove the environmental background of the disorder to a large extent. Since the mental and physical processes are interrelated, one of the causes of appearance or intensification of MPS symptoms is the disorder in the natural relationship of the body and the mind. Hypnotism can program the mind to have a healthier relationship with the body and through this, the individual receives the therapeutic effects deep in their mind even when they do not attempt to do so intentionally (Moghtader, Hasanzade, Mirzaeian, & Dusti, 2016). Freeman, Lessiter, Keogh, Bond, and Chapman (2004), in research "Relaxation Island: virtual, and really relaxing" show that The study explored the influence on mood and presence of the narrative and the VE, interrelationships between

mood and presence, and any effects of mental imagery ability. The narrative was associated with decreases in negative and increases in positive discrete emotion ratings. Presence and increases in relaxation were rated more highly when the narrative was presented within the full VE than on its own. Participants' engagement with the media presentation was positively related to reductions in reported negative affect. Mood change also correlated with mental imagery ability; however, separate analyses show that mental imagery ability only correlated with the target mood change for the narrative only condition (i.e., where no visual display was provided—where mental imagery skills are most useful).

Information and communication technology (ICT) is marching fast, and it has improved psychological interventions in terms of effectiveness and utility. Virtual reality (VR) and telepsychology are two types of technologies that have been mostly using for clinical psychology (Botella, Garcia-Palacios, Baños, & Quero, 2009). VR is a potentially effective method to provide general and specialized health care services. It appears that VR is entering the field of psychotherapy. A panel of 92 psychotherapists answered questions about the future of psychotherapy. The answers revealed that only 18 therapeutic interventions out of 38 psychotherapy methods will become more common in the future decade and VR was at the third rank (Riva, 2005). Therefore, VR can be effective in alleviating the symptoms of PMS.

The literature review revealed that there has been no survey of relaxation based on VR and its effects on the symptoms of PMS. The present study is an attempt to compare the effectiveness of hypnotherapy and using VR in alleviation of the symptoms of PMS.

2. Materials and methods

The study was carried out as a clinical trial random study. The study design was pretest-posttest with a control group.

Study population was comprised of all girl students living in the dormitories of Kermanshah University of Medical Sciences. The candidates filled out a demographics form and Premenstrual Syndrome Screen Tool (PSST). Those with PSST score above 18 were selected as the participants. The PSST is comprised of 19 statements and designed to examine the symptoms of PMS and premenstrual dysphoric disorder (PMDD) and the effects on life. The tool consists of two sections; section one with 14 statements about mood, physical, and behavioral symptoms; and section two with five statements that measure the effects of the symptoms on life. The tools is designed based on Likert's four-point scale (never = 0, trivial = 1, moderate = 2, and severe = 3). To confirm a moderate or severe case of PMS, three following conditions should be met:

- (1) At least one of the statements 1–4 is severe or moderate.
- (2) At least four of the statements 1–14 are severe or moderate.
- (3) At least one of the last five statements is severe or moderate.

The Cronbach's alpha of PMST in Iran is obtained equal to 0.9 and the content validity ratio and content validity index are equal to 0.7 and 0.8, respectively—i.e., acceptable validity (Siah Bazi, Montazeri, & Moghaddam, 2011).

According to the Department of Students Affairs of the university, 700 students lived in the dormitories (a limited population); therefore, the number of participants for a limited population was obtained as follows:

$$n = \frac{n_0}{1 + \left\{ \frac{n_0 - 1}{N} \right\}}$$

Taking into account the probable leaves throughout the study, the number of participants was increased by 10% (two more participants; $n = 25$). To improve test power and reliability of the

findings, the number of participants was further increased and 30 participants were selected for each group (total participants = 90).

Sampling method was convenience (non-random), but allocations to groups were performed randomly by assigning students with even student numbers in the interventional groups and those with odd student numbers in the control group.

Inclusion criteria were age at the range of 18–27, regular menstruation cycle (26–31 days cycle), normal menstrual bleeding of 3–8 days, and PSST score >18 (severe and moderate cases).

Exclusion criteria were the history of drug abuse or smoking, history of ovarian cyst and gynecology surgery, history of background diseases effective in PMS (including cardiac, respiratory, and renal diseases, hypertension, asthma, diabetes, epilepsy, migraine, thyroid disorder, anemia, and mental and neural diseases), history of mental diseases and depression, history of using antidepressants, sedatives, and hormonal drugs, a traumatic event (e.g., death of loved ones and divorce) over the past 3 months.

The education sessions were held by a psychologist (PhD in psychology) licensed to carry out hypnotism therapy session and using VR technology by Iran Clinical Hypnotism Association (Table 1). The intervention consisted of three 30 min sessions every week at the office of dormitory consultant. Posttest was carried out 3 months after the last session.

In observance of moral codes, a letter of introduction was secured from the Research Department of the university and handed over to the head of dormitories. Participation in the study was voluntarily and the participants were ensured about confidentiality of their information. In addition and after conducting the study, the control group was given the opportunity to attend an educational workshop.

3. Results

The mean and standard deviation of age of the participants was 23.81 ± 5.49 . Paired t-test indicated a significant difference between pretest and posttest mean scores of PMS in the VR and hypnotism groups ($P < 0.001$). The difference in the control group was not significant (Table 2).

Moreover, the one-way ANOVA results indicated a significant difference between pretest and posttest mean scores in the hypnotism and VR groups (Tables 3 and 4).

Tukey's post hoc test showed that there was no significant difference between the VR and hypnotism groups, while the difference between the control group and the two intervention groups was significant ($P < 0.001$) (Table 5).

As listed in Table 3, the effectiveness of VR and hypnotism relaxation methods on PMS was not significantly different. However, there was a significant difference between the VR and hypnotisms groups and the control group ($P < 0.001$).

4. Discussion

The severity of PMS symptoms in the participants in hypnotism and VR relaxation groups decreased significantly comparing with the participants of the control group.

Shah, Monga, Patel, Shah, and Bakshi (2016) carried out a study with the similar design and compared the severity of pain in women with dysmenorrhea. Their results showed that the severity of pain in NSAIDs (nonsteroidal anti-inflammatory drugs) group was less than that in hypnotism group during the first three cycles after the intervention. In the following cycles however, the decrease of the severity of pain in the hypnotism was more than that in NSAIDs group. They concluded that the decrease in menstruation pain achieved by hypnotism was more persistent.

Table 1. The stages of invention (Relaxation through hypnotherapy and Virtual reality technology)

Invention	Number of session	Content of session
Hypnotism	First session	The PMS and the physical and mental outcomes were covered throughout the hypnotism intervention sessions for the experiment group.
	Second session	This session was allocated to explaining hypnotherapy, correcting wrong beliefs about hypnotism, and practicing medication through guided mental imagery and hypnotic indoctrination.
	Third session	The last session was dedicated to teach self-hypnotism to the participants to enable them to do self-hypnotize when needed.
Virtual reality technology	First session	The PMS and the physical and mental outcomes were covered throughout the hypnotism intervention sessions for the experiment group.
	Second session	In this session, participants in experiment group 2 (relaxation using VR) were taught about using VR headsets and smart phones and relaxation through watching 3D relaxing images.
	Third session	Relaxing by watching 3D relaxing images.

Table 2. The Mean and SD score of PMS before and after the intervention

Group	Sample Sizes	Before the intervention		After the intervention				
		N	Mean	SD	Mean	SD	T	P-Value
VR	30		28.83	8.53	15.87	7.39	9.47	0.001
Hypnotism	30		29.43	8.28	14.27	6.60	11.80	0.001
Control	30		29.46	6.12	29.83	5.79	-0.945	0.325

Farshbaf Manei Sefat, Abolghasemi, Barahmand, and Hajloo (2017) examined the effectiveness of cognitive-behavioral treatment and self-hypnotism educations on alleviation of dysmenorrhea in students. They concluded that the severity of pain decreased significantly in the intervention groups comparing with the control group. They also reported that hypnotism was more effective than the cognitive-behavioral education.

Asgariani, Barat, Moudi, Hamidia, and Bijani (2018) studied the effectiveness of hypnotherapy and muscles relaxation practices in alleviation of the symptoms PMS. They reported that hypnotherapy was significantly effective in PMS and alleviated the symptoms. Consistent with our findings, other studies have also confirmed the effectiveness of muscles relaxation on alleviation of dysmenorrhea and the symptoms of PMS (Asgariani et al., 2018; Dehghan, Jalali, & Bashiri, 2019; Dvivedi, Dvivedi, & Kaur, 2011; Jasuja, Purohit, Mendpara, & Palan, 2014; Kamali, Goreishizade, & Mohammad, 2002; Moemeni & Zalipour, 2014; Shah, Monga, Patel, Shah, & Bakshi, 2014).

Hypnotism decreases sympathetic activities in patients and improves inner peace. It may also cause desired therapeutic changes in the physiology, feelings, and behaviors of patients. Such changes and its effectiveness in pain in particular are induced via anterior cingulate gyrus in the brain (Shah et al., 2014).

Although, the exact mechanism of relaxation function is not clear, it appears that psychosomatic treatments like relaxation practices induce relaxation responses. Changes in the sympathetic nervous system such as decrease in heartbeat rate, hypertension, musculo-skeletal tone,

Table 3. One way ANOVA of PMS before and after the intervention

							95% Confidence Interval for Mean				
		N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum		
Pretest PMS	VR	30	28.8333	8.53424	1.55813	25.6466	32.0201	16.00	43.00		
	Hypnotism	30	29.4333	8.28660	1.51292	26.3391	32.5276	15.00	43.00		
	Control	30	29.4667	6.12363	1.11802	27.1801	31.7533	19.00	39.00		
	Total	90	29.2444	7.64274	.80562	27.6437	30.8452	15.00	43.00		
Posttest PMS	VR	30	15.87	7.394	1.350	13.11	18.63	3	34		
	Hypnotism	30	14.27	6.602	1.205	11.80	16.73	5	28		
	Control	30	29.83	5.796	1.058	27.67	32.00	19	41		
	Total	90	19.99	9.612	1.013	17.98	22.00	3	41		

Table 4. ANOVA

Variables	Cause of variation	Indices	Sum of squares	DF	Mean of squares	F	Sig.
PMS	Pretest	Between Groups	7.622	2	3.811	0.064	0.938
		Within Groups	5191	87	59.667		
	Posttest	Between Groups	4399.489	2	2199.744	50.053	0.001
		Within Groups	38.23.500	87	43.948		

Table 5. Tukey's post hoc test two by two PSST scores comparison

Groups	SD	Sig.
VR vs. hypnotism	1.712	0.620
VR vs. control	1.712	0.001
Hypnotism vs. control	1.712	0.001

and changes in glandular-nervous function were observed in the subjects after relaxation (Lee, Bhattacharya, Sohn, & Verres, 2012).

A decrease in the muscles' tension increases the sense of mental health and peace. The positive effect of relaxation can be also explained based on the techniques of diverting attention. Relaxation reorients concentration on inner desired feelings and causes physiological arousal caused by positive emotions. Through this, the individual tends to concentrate less on stressors and anxiety causing factors. Endorphins that are secreted at the end of neural fibers can alleviate the pain and create a sense of euphoria and hilarity. Studies on PMS have supported the role of a decrease in endorphins in development of the symptoms. Decrease in endorphins secretion is the main cause of feeling pain, higher irritability, and depression in patients with PMS. Moreover, there are evidences that relaxation through watching relaxing images and films using VR headsets and hypnotic indoctrinations increases secretion of endorphins from the neural terminals. An increase in the secretion of endorphins alleviates the majority of symptoms of PMS (Shahidi, 2008).

Other studies have surveyed the effect of hypnotherapy on some of women's health problems like dysmenorrhea, women's malignancies. For instance, Shah et al. (2014) studied the effect of hypnotism on dysmenorrhea. The study used five nursing students at the age range 18–21 years divided into two groups. One group received hypnotherapy and another group received nonsteroidal anti-inflammatory drugs (NSAID) for three menstrual cycles. The results showed a significant improvement in the quality of life of the two groups after the intervention. However, there was no significant difference between hypnotism and NSAID groups in terms of the level of improvement. Hypnotism led to a decrease in sympathetic activity in the patients and created internal relaxation. Hypnotism can create desired therapeutic changes in physiology, feelings, and behaviors of patients, and these changes (effectiveness in pain in particular) are created through influencing anterior cingulate gyrus in the brain.

Shah et al. (2016) carried out a study similar to in terms of target group and design and compared pain in the patients at intervention and control groups. The results showed that during three early cycles after the intervention, NSAIDs group experienced more decrease in pain comparing with hypnotism group. However, the decrease in pain was higher in the hypnotism group during the later

menstrual cycles (4–6 months after the intervention) comparing with NSAIDs group. The study concluded that a decrease in menstrual pain by hypnotism treatment was more persistent.

As to the advantages of the present study, it is notable that the study was carried out by a psychologist licensed to practice clinical and applied hypnotism by Iran Clinical Hypnotism Association. In addition, since the study was carried out at dormitories, perfect follow up was feasible, which adds to reliability and accuracy of the study and decreases error type II.

With regard to limitations of the study, it is notable that conducting a blind study was not possible since carrying out the study required regular contacts between the authors and participants.

Only the PSST scores were used to assess PSM in the subjects. Future studies can use more accurate assessment methods like clinical interview. Since the study was on young students, the findings can be generalized only to young women not to all women.

Given the results and findings of the present study and similar studies supporting the effectiveness of relaxation in the symptoms of PMS, such interventions that are not time consuming are recommended for students that normally work at tight schedule. The planners and health consultants at universities and clinics need to pay more attention to empowerment programs for students to cope with the spiritual and mental traumas that are normally experienced by students.

5. Conclusion

Implementation of relaxation programs for girl students with PMS living in dormitories decreased the intensity of symptoms of PMS. University girls undergo one of the most critical stages of their lives and PMS can have debilitating effects on social and academic performance of the students. In addition and comparing with hormonal and pharmacological interventions, relaxation is less expensive and causes fewer side effects. Using such interventions to improve health of the students is recommended. In general, the results supported the effectiveness of hypnotism and VR relaxation in alleviation of the symptoms of PMS in young women.

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Authors' Contributions

SH contributed to the design, FD statistical analysis, FD participated in most of the study steps. SH and FD prepared the manuscript, assisted in designing the study, and helped in the interpretation of the study. All authors have read and approved the content of the manuscript.

Ethics approval and consent to participate

This study was approved by the Ethical Committee of the Kermanshah University of Medicine Science (approval number KUMS.REC.1396.390). In addition, the study is registered with Clinical Trial Registration Center under the code: IRCT20151208025433N4.

Availability of data and materials

Datasets are available through the corresponding author upon reasonable request.

Competing Interests

The authors declare that they have no conflict of interest.

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