



Original Article

The Placebo and Laughter Therapy Efficacy on Pain Perception, Sleep Quality, and Post-traumatic Growth in Recovering Drug Abusers

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ABSTRACT

This research was designed to study the efficacy of placebo and laughter therapy on pain perception, sleep quality, and post-traumatic growth in recovering drug abusers. Thus, among 1050 patients who had been referred to the Empowerment and Protection Center for Recovered of the Hamrahan Aftab of Sari City in Iran during the last 5 years (2016-2021) 60 recovered were randomly selected. This study was conducted with a quantitative structure in the form of an experimental design with pre-test-post-test and control in three experimental and control groups. Thus, 4 independent groups were selected by simple random assignment and each of them was exposed to placebo, laughter therapy, combination therapy, and neutral approaches (control group), respectively. Findings were presented in two descriptive and analytical sections: the descriptive section addressed the status of each variable in the statistical sample and in the analytical section, the relationship between the independent variables with each of the three dependent variables of the research, including pain perception, sleep quality, and post-traumatic growth, was measured. The statistical tests included univariate regression (to measure the simple relationship between independent and dependent variables) and T-test (comparing the effectiveness of variables). Findings demonstrated that each of the studied factors, placebo and laughter therapy, had an effect on all dependent variables of pain perception, sleep quality, and post-traumatic growth so that both of these factors (independently) reduce pain perception, increase sleep quality, and increase growth after injury. However, the T-test demonstrated that in all groups the effect of laughter therapy was higher than placebo (that is, laughter therapy has been able to reduce pain perception and increase sleep quality and post-injury growth in drug abuse recoveries more than placebo), which can pave the way for drug addiction treatment, life recovery afterward, and complete recovery: Laughter therapy is formed easier than placebo, has lower costs, and higher efficiency. Conclusively, findings were similar in the follow-up period (quarterly).

GRAPHICAL ABSTRACT



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Introduction

Statement of the problem

Drug abuse is a common phenomenon in many countries, such as the United States, some European countries, and especially in the Middle East and Eastern societies such as Iran, Afghanistan, Pakistan, etc. In other words, according to Zeng and Tan [1], drug abuse is today a widespread phenomenon, and many countries are facing this problem. Hence, although research on the drug addiction issue, has a long history and is somewhat repetitive, is still continuing. Since it is thought that each new study and research will clarify new dimensions of the addiction issue for researchers. For instance, Tesfai [2] states that a reason for the persistent requirement for research in the addiction field is that most of the studies focus on identifying the factors affecting the occurrence and formation of addiction and not its treatment, and therefore, states that in most countries, addiction is not only untreated yet, but is increasing in somewhere. For instance, according to reports, the rate of addiction among American adolescents has increased by 5 and 6 percent in 2021 compared with 2019 and 2018, respectively, or according to reports in the same country age of drug tendency and addiction has also dropped to around 15 years old. Similar information and data can be observed in other countries such as Turkey, Ukraine, Bulgaria, and Iran. According to the report of the Iran Health Organization, the potential age to enter the category of addiction and drug abuse is estimated in 12 years in the country [1].

These data show that despite the widespread attention of most countries to the addiction issue and its reduction, what has been neglected so far in this area is the treatment of existing addictions. Since it is possible to drastically reduce the count of addicts if they are treated. Accordingly, after stating the factors affecting addiction, some researchers have identified the consequences of addiction among drug addicts in their study, and then tried to provide treatment for each of them. For instance, in some of these studies, these outcomes often include tolerating widespread and sometimes severe pain, sleep disorders, and developmental disorders, especially among

youths. However, the main issue in these lines of research is their attention to medication therapy, which, according to Tesfai [2], the harmful side effects of these medications are no less than addiction. This study was designed on this basis, and tried to find out whether there are other ways to improve the symptoms of drug abusers, and reduce their demand for drugs, or not? In other words, the main issue of this study is whether there are other ways to treat the main symptoms in addicts and their tendency to use drugs or not? Addressing this issue, to reduce or eliminate the post-traumatic effects of addiction in drug addicts, or in other words, to treat the addiction category two factors of placebo and laughter therapy have been selected, respectively, as material and immaterial variables. Placebo means utilizing a medication that has no effect on the patient and therefore has no side effects, but due to its inductive aspect may improve the symptoms of addiction in the patient. The placebo phenomenon is related to patients' direct perception or experience of treatment, which means seeing, smelling, and hearing. The placebo response is also measured as a change in pain observed or perceived after prescribing a placebo. The placebo approach is derived from Levine and Gordon's theory. They believe that many physical or mental disorders such as pain, sleep problems, etc. can be solved through a placebo. Given that, according to the previous research, most addicts suffer from problems such as pain, sleep, and developmental disorders, based on this theory, it appears that a placebo can probably reduce some similar disorders in drug abusers.

Due to its effects on individuals, laughter therapy also improves the symptoms and disorders caused by drug abuse. Laughter therapy has a long history of healing. Laughter therapy was first proposed and studied by Norman Cousins in the mid-twentieth century [3]. Decades later, Dr. William Fry of Stanford University discovered the benefits of laughter on the immune, cardiovascular, and endocrine systems through experimental research [4]. More recent studies have focused on laughter therapy. At present, there is no clear definition of laughter therapy. Most researchers think that laughter therapy is an exercise consisting of

unconditional laughter exercises with yoga breathing techniques [5]. Laughter is defined as: "Any intervention that promotes health by stimulating a game, expressing or understanding the absurdity, or incoherence of life situations." This intervention may improve health or be used as a complementary treatment to facilitate treatment or coping [6]. Laughter therapy achieves the goal of treatment through spontaneous and non-spontaneous laughter, in order to prevent, improve and maintain physical, social, and mental functioning and then contributing to a satisfying life. Laughter interventions mainly include LY and the Laughter Qigong Program (LQP), which uses laughter simulation as a physical exercise, including warm-up, stretching, body movement, and meditation. In general, laughter can aid people to dispose of negative emotions and make them contented [7]. The laughter therapy approach is also derived from the theories of Cousins and Zhao *et al.* They believe that due to psychological effects and physiological changes occurring in the human body, alone and without requiring other factors, laughter can affect the treatment of some physical problems such as some pains or some mental traumas to some extent. According to this theory, it can be imagined that laughter therapy reduces the created problems and effects of drug abusers. Accordingly, the main issue in this study is whether placebo and laughter therapy have an effect on pain perception, sleep quality, and post-traumatic growth in recovering drug abusers? In other words, the problem of the study is that, in terms of pain perception, sleep quality, and post-traumatic growth what changes make placebo and laughter therapy in recovering drug abusers?

Theoretical and experimental basis

Placebos

Placebos are usually conceptualized as passive treatments such as sugar pills, saline injections, or fake surgeries used as controls for active treatment. The effects of placebo are an ideal example of the extraordinary effect of psychological processes on pain, which indicates a change in pain biomarkers and is distinct from other psychological pain-manipulating

mechanisms such as distraction. The placebo effect is a psychological response that may occur following active and inactive interventions. Utilizing an inactive medication with positive information about its analgesic effects can reduce pain. Likewise, the negative information can reverse the analgesic effect of a medication named a "nocebo" effect. Social learning (observing the effects of one treatment on others) also aids to form placebos in individuals.

Laughter therapy

Laughter is an emotional reaction that affects a person's individual and social life and has characteristics distinguishing it from other emotional reactions [8]. Laughter is a physical reaction observed in humans and some other mammalian species and usually consists of rhythmic and often audible contractions of the diaphragm and other parts of the respiratory tract. Laughter is a response to certain external or internal stimuli that can result from activities such as tickling or humorous stories and thoughts [9, 10]. Since laughter therapy does not require specialized preparations such as facilities and equipment, does not cost anything and does not depend on time and place, and is easily accessible and acceptable, therefore is in the program of the medical world [11, 12]. Although laughter therapy began with Hippocrates and Aristotle, it was not approved until the twentieth century. In the middle of the twentieth century, Norman Kazens established the effects of laughter in a modern environment and presented laughter therapy. At the age of 50, he realized that he did not feel pain while watching TV comedy shows. Upon discovering this fact, he began to seriously study the medical and clinical effects of laughter. "Laughter is like a bulletproof vest," Kazens said in his book *Anatomy of an Illness* [13]. Madan Kataria invented laughter yoga (LY) by combining breathing techniques with laughter and started laughter clubs in 1995 for enjoying the health benefits of using real or fake laughter [14]. Afterward, laughter interventions were gradually used in a variety of areas as useful interventions such as care for the elderly, cancer, and chronic diseases [15]. The extensive research over the

past two decades in different countries has proven that laughter has a positive effect on humans and is effective in strengthening the immune system. Scientists have also found that laughter has value in prevention and treatment [16]. People who do regularly laughter exercises have experienced improvements in their physical health [8]. Laughter exercises can affect organs and muscles, induce blood biochemical changes, and affect oxygen physiologically. Laughter therapy decreases the levels of stress hormones and increases the levels of health-promoting hormones such as endorphins, and by increasing T lymphocyte counts through activating natural killer cells that proliferate white blood cells in the body strengthens the immune system [17-19]. There is also evidence that joyful laughter increases pain tolerance [20]. In addition, it controls blood pressure by controlling vasoconstriction by reducing the breakdown of vasodilators, nitric oxide, and lowering cortisol, resulting in increased blood sugar [21, 22]. All of these play an important role in the prevention and potential treatment of the disease [8]. Studies have shown that when a person pretends to laugh or be happy, chemicals (such as dopamine, serotonin, etc.) are produced in the body that causes a state of happiness. Therefore, laughter is effective in causing physiological changes in the body. According to the principle of "motion creates emotion", if a person puts his body in a state of happiness, the mind also goes to a state of happiness [16]. Laughter can aid induce feelings of happiness and potentially reduce depression by releasing neurotransmitters from brain cells. According to modern medicine, disease originates in our minds. Laughter therapy aids reduce unpleasant emotions such as stress, anxiety, hatred, and anger, reduces stress and depression, aids improve interpersonal relationships, and reduces insomnia, memory loss, and dementia [11, 23]. Laughter, as part of the solution to mental health problems, may provide a desirable non-invasive and non-pharmacological treatment that restores happiness by healing the human body and soul, and improving the quality of life and self-esteem [14]. A longitudinal study also showed that a distraction task during a painful intervention can

affect patients' pain response up to 2 years after the initial distraction [24]. The distraction of pain works between the processing of exogenous and endogenous information. Perception of endogenous stimulus (pain) is suppressed by consciously focusing attention on a non-pain stimulus. Another theory, laughter can be utilized as a mechanism for a cognitive reassessment of stressful events, which in turn promotes flexibility and welfare [25]. Accordingly, laughing exercise programs as a complementary step to the treatment of drug abusers' well-being may be very beneficial [26]. We, therefore, hypothesized that problems such as depression, anxiety, loss of self-confidence, and sleep disorders experienced by drug abusers may be improved through laughing exercises as a complementary therapy. We hypothesized that a course of laughter exercises may improve pain perception, sleep quality, and post-traumatic growth in drug abusers.

There are three categories of laughter theories: arousal, incongruity, and superiority [27, 28]. The first is the theory of arousal, which deals with the cognitive aspects of laughter: that stress increases arousal, while laughter can reduce stress by reducing arousal and tension. This theory states that if people laugh in a stressful situation, their physical arousal decreases and the stressful situation is no longer negative or disgusting. Therefore, laughter can improve pain perception and sleep quality. Freud [29] also believed that laughter reduces negative emotional responses or unpleasant feelings. Second, the theory of incongruity relates to the cognitive aspect, which says that laughter begins with a disturbing process, situation, or thought, apart from the knowledge or logic that people are usually familiar with. This theory states that people laugh when they realize there is a difference between their real situation and their general knowledge about it [30]. Third, is the theory of superiority, which states that laughter occurs when people look at others belittling, or when they feel or think they are superior to others. This theory states that laughter limits the external environment and increases self-confidence [31]. Increasing satisfaction, laughter allows people to take adequate action against stress and increase self-

confidence [13]. In this way, laughter can also improve post-traumatic growth in recovering drug abusers.

Materials and Methods

The statistical population of the study consists of recovering drug abusers in Sari. Firstly, according to the Iranian police force, the recovered cases in this city, concerning the population ratio, is more than in many other cities. Secondly, the diversity of the recovered group is high due to drug abuse (blue collar and white collar) and thirdly, the income distribution is higher in the recovered group (groups with different incomes) in this city. This group is those who have already quit their addiction in different places and in different ways, and to recover after drug use referred to the Hamrahan Aftab Companions medical center in Sari (the only center for training and holding classes to prevent re-addiction among recovering drug abusers). Therefore, these cases have not used drugs for at least one month prior to visiting the center, and because they have traditionally or scientifically performed the detoxification process. In the center, the recovery in terms of addiction courses has been studied (start time, end and number, withdrawal methods, consumables, etc.) retrospectively. Therefore, the statistical population of this study is all recovered of drug abuse in Sari city, and given that only one center in this province is serving the recovering drug abusers; out of about 1050 recovered drug abusers during the last 5 years, 60 people were randomly selected and performed for a clinical trial with 4 groups of random appointments: 1. The first group, who were exposed to laughter therapy, 2. The second group, known as the placebo group, was given ineffective medications, 3. The third group, which is the control group and is not subject to any material treatment (placebo) or immaterial (laughter therapy), and their condition is supposed to be compared with the other two groups in terms of three desired variables (sleep quality, pain quality, and post-traumatic growth), and 4. the fourth group who were exposed to laughter therapy and placebo (Table 1). The work time (whether laughter therapy or placebo) was about 1 month and then

the recovered patients were tested. However, after 3 months, a follow-up phase was performed during which each of the 4 groups was tested again.

In this study, 3 questionnaires on pain perception, sleep quality, and post-traumatic growth were used to measure the dependent variables. The McGill Pain Questionnaire (MPQ) has 20 sets of phrases and its purpose is to assess a person's perception of pain in different dimensions (four dimensions of pain, sensory, affective, evaluative, and miscellaneous perceptions) (Melzack, 1997). This questionnaire has two independent factors: one is sensory pain which describes the pain experienced in the individual and the other is effective pain which describes the emotional impact of the pain experience (Mason et al., 2008). In this study, the revised form of this questionnaire (due to some of its specific limitations) designed by Durkin et al. (2009) was utilized. This questionnaire has a 0 to 10 scale. The reliability and validity of this questionnaire have also been confirmed by Durkin *et al.*

The Pittsburgh Sleep Quality Index (PSQI) was developed by Dr. Boyce, Rilond, Monk, Berman, and Kopfer (1989) at the Pittsburgh Institute of Psychiatry to assess the quality and pattern of sleep. This questionnaire consists of 18 phrases that determine the sleep quality of individuals by evaluating seven characteristics during the last month. These include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medications, and daytime dysfunction. Each of the 7 subscales of this questionnaire has a score of 0 to 3, and higher scores indicate poor sleep quality. Dr. Boyce *et al.* (1989) obtained the internal consistency of the questionnaire using Cronbach's alpha of 0.83. In their study [32], Keskin and Kilicoglu (2009) reported the reliability of this questionnaire, based on Cronbach's alpha of 0.83 [33].

The Tedeschi and Calhoun (1996) questionnaire was used to measure post-traumatic growth. The test has 21 items scored on a 6-point Likert scale, the higher score indicates more growth, and consists of five subscales that include relationships with others, new possibilities,

personal strength, spiritual change, and appreciation of life. Cronbach's alpha coefficient for the overall scale of 0.90 and the reliability of the two halves of the test were obtained using the Spearman-Brown coefficient of 0.87 [34].

In providing a placebo through a physician coordinated by the researcher (physician of the center) to improve the sleep quality and symptoms and physical pain, a completely ineffective placebo (sugar capsule), while emphasizing its high efficacy and significant healing power prescribed was fed to the subjects of the respective group at the appointed times by

the researcher. Laughter therapy intervention was held with Madan Kataria pattern and physical activities appropriate to the physical condition of the intervention group as a group by the researcher during 12 sessions (three days a week, each session for an average of 90 minutes). The first session commenced with a pre-test, familiarity with the benefits of laughter, and the goals of the intervention and the last session ended with summarizing, evaluating the post-test, and emphasizing and presenting instructions for life expectancy, and the techniques used during the sessions were described in [Table 2](#).

Table 1: Research plan

Group	Pre-test	Independent variable	Post-test	Follow-up
E ₁ – Laughter therapy	T ₁	X ₁	T ₂	T ₃
E ₂ – Placebo	T ₁	X ₂	T ₂	T ₃
E ₃ – Integrated intervention	T ₁	X ₂	T ₂	T ₃
C– Control (neutral)	T ₁	-	T ₂	T ₃

Table 2: Laughter therapy intervention techniques

A brief talk about some exhilarating topics:	For instance, having national and religious celebrations, having a positive feeling in daily work, living in the present, and now performing activities. This stage is the mental preparation of the person for laughter therapy exercises.
Clapping with 1, 2, and 3 rhythms	Clapping with open hands so that the fingers and palms are in contact with each other. The purpose of this step is to stimulate the sensitive points of the hands to increase the energy level.
Hands movement	Moving the arms up and down in a pendulum form along with movement in other parts of the body.
Singing short and simple phonics	Adding phonics, ha ha hoo hoo while clapping and moving the body. Kataya believed that uttering phonics had the same effect as deep exhalations coming out of the abdomen and stimulating the diaphragm.
Harmonious movements: Add harmonious and rhythmic movements to increase vitality and exultation	Harmonious movements: Adding harmonious and rhythmic movements to increase vitality and exultation.
Broken and incomprehensible words	Adding broken and incomprehensible words like the words children say in the play. These words are similar to movements used to warm up before laughing yoga exercises to aid reduce individual barriers and shyness.
Laughter exercises	These exercises aid the person to achieve both mental and physical relaxation.
Applause after laughter exercises	One of the purposes of Laughter Yoga is to encourage childish playfulness that helps the person to laugh for no reason. Applause after each exercise of laughter is used to achieve this goal.
Doing laughter yoga exercises	Each exercise lasts 30-45 seconds and is accompanied by clapping, singing ha ha hoo hoo, and two deep breaths. Includes training of 2 techniques in each session, laughter yoga techniques (belly laughter, laughter with the mouth closed, and gradual laughter) exhilarating laughter techniques (one-meter laughter, gossipy laughter, telephone conversation laughter, and shy laughter), and value laughter techniques (healthy laughter and greetings, respectful and appreciative laughter, apologetic and forgiving laughter, handshake laughter, hugging laughter, and so forth).

Suggestive positive sentences	At the end of each session, participants shout and repeat, "I am the happiest person on earth." and looked at each other and laugh.
Group physical activities	8 Sessions of group aerobic exercises including slow running and stretching movements are utilized. The duration of each session is 30 minutes and the exercises of each session are different in terms of the type of movements and the amount of exhilaration, and their intensity. It should be noted that the last five minutes of each session are dedicated to cooling the body. These two treatments are performed simultaneously after a 15-minute rest.

After going through the stages of drug therapy and khandanema, questionnaires related to sleep quality measurement, pain perception, and post-injury growth were once again provided to the members of the statistical sample and the data were analyzed using appropriate tests. In this way, after providing a description of them, the data were analyzed using two univariate regression tests (to measure the simple relationship between independent and dependent variables) and T-test (to compare the influence of variables).

Research hypotheses and answering them

Hypothesis 1: Laughter therapy is effective on pain perception, sleep quality, and post-traumatic growth in recovering drug abusers.

Sub-hypothesis 1-2: Laughter therapy is effective on pain perception in recovering from drug abuse [35, 36]. Pain is an uncomfortable feeling that can occur acutely or chronically. Acute pain is defined as a natural physiological response to an adverse chemical, thermal, or mechanical stimulus associated with surgery, trauma, and acute illness [37]. Chronic pain, on the other hand, refers to pain in one or more parts of the body that lasts more than three months and is associated with mental and emotional problems or inability to function daily, as well as participation in social activities [38]. Laughter enables humans to observe stressful situations as challenging than threatening and consequently feel more in control of the event [39]. In addition, laughter as a coping strategy can aid a person distance himself from the emotional impact of an event and refocusing on its positive aspects [40]. Finally, it has been claimed psychologically that laughter is associated with the decreased cortisol, growth hormones, and epinephrine [41]. Therefore, in this case, laughter aids people to evaluate pain as less negative and stressful than in the past.

Hypothesis 2-2: Laughter therapy affects sleep quality in recovering drug abusers. Sleeping well is essential for a high quality of life. However, in recent decades, people have suffered from insomnia due to the stress of life, irregular sleep patterns, etc.

Sub-hypothesis 3-2: Laughter therapy is effective in post-traumatic growth in recovering drug abusers.

Hypothesis 2: Utilizing a placebo is effective on pain perception, sleep quality, and post-traumatic growth in recovering drug abusers. Classical conditioning (previous experience with treatment) and verbal information about the effectiveness of treatment are involved in inducing placebo effects and expectations. Therefore, in this study, placebo effects were modulated by verbal information and/or classical conditioning and the other factors. Treatments, whether active or inadequate, are performed in a combination of situational elements such as pharmacological characteristics (such as pill color), healthcare environment (hospital or clinic design), and characteristics and behavior of the examiner/physician. Such subtle environmental arrangements can affect the outcome of treatment. For instance, Slyusarenko *et al.* [42] used three different methods to prescribe an ineffective substance (injection by a person sitting next to a patient and providing suggested information, injection by a person in an adjoining room, or injection by a programmable machine) and showed that subtle signs prescribed in a pain medication form can intensify the placebo response. The placebo treatments can be performed with three separate areas of information: dual uncertainty: "You may receive medication or placebo." certainty in deceptive trials: "You will now receive a powerful medication " or, honestly, "I will prescribe you a

placebo", which is a paradoxical "certainty uncertainty".

Sub-Hypothesis 1-2: Utilizing a placebo is effective on pain perception in recovering drug abusers. A summary of the World Health Organization (WHO) report on chronic pain from 10 developed countries and seven developing countries shows a prevalence of 37.3% and 41.7%, respectively: arthritis joint pain and back/neck pain, migraines, and severe headaches. Many people with chronic pain have multiple sites of pain, and the most common condition of chronic visceral pain is irritable bowel syndrome. Chronic low back pain is alone the leading cause of disability in most countries of the world. The brain not only passively perceives chronic pain, but can also play a role in its own intensification. This is because, in the context of prediction processing, there is another way to minimize prediction error in the production of physical action. If in terms of perception, the brain revises its predictions to match the input, in practice, it minimizes the prediction error by modifying the inputs so that they can match the prediction. In chronic pain, the brain may subconsciously produce visceral sensations (such as stomach tension) that are consistent with the pain hypothesis. This hypothesis predicts that therapeutic rituals and active materials of the intervention, through different pathways, operate on the same inferential process by which we experience symptom relief. The first reinforces the predictions of imminent health by providing external evidence that recovery is taking place (through ritual representation, verbal interaction, etc.). The latter reinforces imminent health predictions by eliminating the source of pain inputs or, in the case of symptom-relieving medications, by stimulating neurotransmitters that encode top-down predictions for accuracy. In addition, placebo treatments for chronic pain involve neurotransmitters that are different from the acute pain experienced in the laboratory. Nevertheless, acute pain trials provide important evidence of conceptual findings that shed light on the effects of placebo.

Sub-hypothesis 2-2: Utilizing a placebo is effective on sleep quality in recovering drug abusers.

Sub-hypothesis 3-2: Utilizing a placebo is effective on post-traumatic growth in recovering drug abusers.

Hypothesis 3: Utilizing a placebo and laughter therapy is effective on pain perception, sleep quality, and post-traumatic growth in recovering drug abusers.

In this study, 60 recovered cases were studied. These cases were in the age group of 18 to 60 years old and most of them (about 68%) were married, some of whom were divorced at the time of the investigation and the rest either lived away from their families or at least had some conflicts in the home that demonstrates their disorganized condition. Hence, Therefore, it was felt that they required intervention. Respondents of group A were initially studied in terms of three variables of pain perception, sleep quality, and post-traumatic growth, and then were exposed to 12 sessions of laughter therapy. Group B was similarly studied in terms of the three variables and received a placebo. Group C was exposed to both treatments, and ultimately, group D did not experience either. [Table 3](#) indicates the status of recurrence rates of respondents in terms of addiction quit and [Table 3](#) presents the respondents status in terms of dependent variables.

The data listed in [Table 4](#) illustrate that most of the respondents are not in a positive condition in terms of all three dependent variables of pain perception, sleep quality, and post-traumatic growth, and these cases, along with the other traumas that threaten recovering drug abusers, may lead them to turn to drugs again. Therefore, the exposure to the factors that lead to the change in their current situation is essential for them. Accordingly, placebo and laughter therapy interventions were performed on the respondents and their status was studied before and after. The respondents status after receiving each of the treatment approaches separately and together, and then with the control group is presented in [Table 5](#).

Table 3: Frequencies of respondents' drug rehabilitation

Number of referring for rehabilitation	Frequency	Frequency percentage	Cumulative frequency percentage
1 to 5 times	18	30.0	30.0
6 to 10 times	20	33.9	63.9
More than 10 times	22	36.1	100.0
Total	60	100.0	

Table 4. Pre-test status of the sample in terms of dependent variables

Variables	Laughter therapy			Placebo			Combined Approach		
	Weak	Moderate	Severe	Weak	Moderate	Severe	Weak	Moderate	Severe
Pain perception	3	5	7	3	4	8	4	5	6
Sleep quality	3	4	8	2	6	7	3	5	7
Post-traumatic growth	3	4	8	3	5	7	2	5	8

Table 5: Post-test status of the laughter therapy group in terms of dependent variables

Variables	Post-test			Follow-up		
	Weak	Moderate	Severe	Weak	Moderate	Severe
Pain perception	7	5	3	7	5	3
Sleep quality	8	4	3	8	4	3
Post-traumatic growth	9	3	3	8	4	3

The above data demonstrate significant changes in pain perception, sleep quality, and post-traumatic growth in respondents occurred as a result of laughter therapy, and this finding leads the researcher to the next tests.

The data provided in Table 6 demonstrate that significant changes in pain perception, sleep quality, and post-traumatic growth in respondents occurred as a result of utilizing a placebo in the post-test and follow-up stages, and this finding leads the researcher toward the next test.

The data provided in Table 7 demonstrate the reciprocal findings (opposite), so that in Table 7

since the experimental group was exposed to both groups, the scores display a better situation in terms of dependent variables, while in the control group (Table 8), there is a slight difference with the initial group (pre-test groups). Accordingly, the hypotheses can be tested

The first hypothesis of the study states that laughter therapy is effective on pain perception, sleep quality, and post-traumatic growth in recovering drug abusers. Given that the hypothesis is made of three sub-hypotheses, in the initial step, the relationship between laughter therapy with each of these variables.

Table 6: Post-test status of the placebo group in terms of dependent variables

Variables	Post-test			Follow-up		
	Weak	Moderate	Severe	Weak	Moderate	Severe
Pain perception	7	5	3	6	5	4
Sleep quality	8	4	3	7	4	4
Post-traumatic growth	8	4	3	7	4	4

Table 7: Post-test status of combined therapy in terms of dependent variables

Variables	Post-test			Follow-up		
	Weak	Moderate	Severe	Weak	Moderate	Severe
Pain perception	8	5	2	7	5	4
Sleep quality	9	4	2	8	5	2
Post-traumatic growth	9	4	2	8	4	3

Table 8: The status of the control group in terms of dependent variables in the post-test and follow-up stages

Variables	Post-test			Follow-up		
	Weak	Moderate	Severe	Weak	Moderate	Severe
Pain perception	3	4	8	4	5	7
Sleep quality	3	5	7	2	5	8
Post-traumatic growth	2	4	9	3	5	7

Table 9: Regression test between laughter therapy with each of the dependent variables

Independent variable	Dependent variables	Size of the test	Significance level
Laughter therapy	Pain perception	0.436	0.000
	Sleep quality	0.389	0.000
	Post-traumatic growth	0.257	0.000

is examined, and then the more general relationship was measured. The data in Table 9 display the relationship between laughter therapy and each of the research dependent variables.

Based on the above data, laughter therapy affects each of the three variables. However, as can be observed, the greatest effect of laughter therapy is first on pain perception, then on sleep quality, and ultimately on post-traumatic growth. In this way, based on a multivariate regression test, the relationship between laughter therapy and three dependent variables can be measured and show whether laughter therapy is effective at the same time or whether one or some variables should be excluded from the analysis.

The second hypothesis states that utilizing a placebo is effective on pain perception, sleep quality, and post-traumatic growth in recovering drug abusers. Given that the hypothesis is made up of three sub-hypotheses, in the first step, the placebo relationship with each of these variables was examined, and then the more general relationship was measured. The data in Table 10 and 11 illustrate the placebo relationship with each of the dependent variables of the study.

According to the data indicated in Table 12, placebo affects each of the three research dependent variables. However, as can be observed, the greatest effect of a placebo is first on pain perception, then on sleep quality, and ultimately on post-traumatic growth. In this way, based on a multivariate regression test, the relationship between placebo and three dependent variables can be measured and show whether it (placebo) is simultaneously effective on three dependent variables or whether one or some of the variables should be excluded from the analysis process. The data of this test are presented in Tables 13 and 14.

Ultimately, the final (third) hypothesis of the research states that laughter therapy and placebo are simultaneously effective on each of the dependent variables. Given that the hypothesis is made of three sub-hypotheses, in the first step, the relationship between laughter therapy and placebo with each of these variables was examined, and then the more general relationship was measured.

Table 10: ANOVA data

R	R Square	Df	Mean Square	F	Sig
0.336	0.113	3	28.60	154.94	0.000

Table 11: Non-standardized and standardized coefficients

R	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
Pain perception	0.134	0.110	28.60	154.94	0.000
Sleep quality	0.120	0.085	19.75		
Post-traumatic growth	0.108	0.035	10.30		

Table 12: Placebo regression test with each of the dependent variables

Independent variable	Dependent variables	Size of the test	Significance level
Placebo	Pain perception	0.336	0.000
	Sleep quality	0.218	0.000
	Post-traumatic growth	0.160	0.000

Table 13: ANOVA data

R	R Square	Df	Mean Square	F	Sig
0.314	0.098	3	24.35	160.84	0.000

Table 14: Non-standardized and standardized coefficients

R	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
Pain perception	0.125	0.098	24.12	192.70	0.001
Sleep quality	0.113	0.079	10.34		
Post-traumatic growth	0.096	0.065	16.60		

Table 15: Regression test between placebo and laughter therapy with each of the dependent variables

Independent variable	Dependent variables	Size of the test	Significance level
Placebo and laughter therapy	Pain perception	0.496	0.000
	Sleep quality	0.412	0.000
	Post-traumatic growth	0.289	0.000

The data in [Table 15](#) demonstrate the relationship between placebo and laughter therapy with each of the dependent variables of the study. According to the data presented in [Table 15](#), placebo and laughter therapy simultaneously affect each of the three research dependent variables. However, as can be observed, the greatest effect of laughter therapy and placebo is first on pain perception, then on sleep quality, and ultimately on post-

traumatic growth. In this way, based on a multivariate regression test, the relationship between laughter therapy and placebo can be measured with three dependent variables and it can be shown whether it (placebo) is simultaneously effective on three dependent variables or whether one or some variables should be excluded from the analysis process. The data of this test are presented in [Tables 16](#) and [17](#).

Table 16: ANOVA data

R	R Square	Df	Mean Square	F	Sig
0.314	0.098	3	24.35	160.84	0.000

Table 17: Non-standardized and standardized coefficients

R	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
Pain perception	0.125	0.098	24.12	192.70	0.001
Sleep quality	0.113	0.079	10.34		
Post-traumatic growth	0.096	0.065	16.60		

Results and Discussion

This study was designed to identify the effects of laughter therapy and placebo on pain perception, sleep quality, and post-traumatic growth among recovering drug abusers in Sari (Mazandaran Province in Iran). For this, 60 males who had

suffered from drug abuse in the past were randomly selected among 1050 males who had been referred to the Hamrahan Aftab Companion rehabilitation center in Sari for recovery during the past 5 years. Research in Iran (as in many other countries) has displayed that one can never

expect an addict referred to a rehabilitation center for the first or several times to quit the addiction. Since drug abuse is not always due to euphoria or happiness, but in most cases, discomfort and problems, especially in the lower classes of society, and since usually, these factors are still present or even intensify after recovering. Therefore, they may start using drugs again. The result of a preliminary study conducted by the researcher on the statistical samples of this study also demonstrated that due to the unprincipled drug quitting and especially the lack of training and treatment courses, quitting the addiction among the recovered cases in the present study has never been sufficiently stable. Hence, therapeutically, not addiction quitting, but rebuilding life after addiction is required for patients and drug addicts. This means that after quitting the addiction, efforts need to be made to build a new life for them so that the effects of addiction can be completely eliminated with them. For instance, through placebo or laughter therapy, some still remained after quitting effects can be eliminated or reduced and controlled, thus creating the basis for improving the condition of the recovering drug abusers. Therefore, in this study, the effect of two factors of laughter therapy and placebo among the statistical sample was investigated to determine whether these factors can improve the lasting effects on recovering drug abusers, or not? These effects obtained experimentally from those referred to Sari Medical Center (Hamrahan Aftab companions) include pain perception, sleep quality, and post-traumatic growth. However, these factors have been considered in some domestic or international studies, and their theories provide theoretical support for the relationship between laughter therapy and placebo with each of these effects. Based on the findings, it was determined that all recovering drug abusers, who had passed 22 to 168 days after quitting, clearly felt each of the three indicators of pain perception, sleep quality, and post-traumatic growth, and in fact, had these indicators, and thus have exhibited the initial hypothesis of the research, the existence or persistence of some characteristics in the recovering drug abusers.

Accordingly, the recovering drug abusers were exposed to laughter therapy and placebo for one month, and then the relationship between laughter therapy and placebo with the three mentioned indicators was studied and examined among them. For this, 60 male members of the statistical sample were equally divided (groups of 15) into 4 groups by simple random assignment, and each in terms of a characteristic (having one feature, two features, or lack of each feature) were classified. Thus, 4 groups A (laughter therapy), group B (placebo), group C (having both features), and group D (without any of the features or control group) were formed and each was exposed to its own training.

Conclusion

Finally, the findings were analyzed based on the appropriate tests. The findings showed that laughter therapy and placebo were effective in any of the three post-addiction states or effects among the recovering drug abusers, either in the post-test (after one month) or in the follow-up stages (after three months). Thus, laughter therapy and placebo, separately and simultaneously (especially in the second case means together) are effective on the pain perception, sleep quality, and post-traumatic growth in drug abusers in Sari, both in the post-test and follow-up stages. These findings were provable and confirmed either by comparing the respondents in each group with their previous situation or by confronting and comparing with the situation of the control group.

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Authors' contributions

Here, I consider it necessary to appreciate all the recovered subjects of the tests, the population Hamrahan Aftab Companions, the State Welfare Organization of Sari city, and Mazandaran province, with regard to the appropriate groundwork and full cooperation.

Conflict of Interest

We have no conflicts of interest to disclose.

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