

The Effectiveness of Rescripting of Pain Mental Imagery on Pain Intensity in Patients with Chronic Pain

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Abstract

Introduction: Pain-related mental images have an important role in pain experience of the patients and processing of sensory information through cognitive and emotional processes. The treatment protocol for rescripting of pain mental image has recently been complied and validated in order to change the pain perception. This study has been conducted aimed to determine the efficacy of rescripting of pain mental image on the severity of perceived pain by the patients with chronic pain.

Method: this is an empirical study with pre-test, posttest and follow-up stages, conducted on an experiment and a control group. Sampling was done randomly from among the patients with chronic pain who referred to the Specialized Clinic of Pain in Labafinejad Hospital of Tehran. With regard to inclusion and exclusion criteria, 50 subjects were selected and randomly assigned to two groups. Data were analyzed via Variance analysis within and between groups. Results: The results of this study show that rescripting of pain mental image has been effective in the reduction of pain intensity of the patients with chronic pain ($P: 0.001$, $\alpha^2: 0.58$).

Conclusion: Rescripting of pain mental image can be presented as a compact and short-term psychological intervention which may be easily combined with pharmaceutical and physical therapy programs to reduce pain of the patients with chronic pain.

Keywords: Mental Image Rescripting; Pain Image; Chronic Pain.

1. Introduction

In the discussions of pain perception and pain phenomenology, visual imagery has been explained as a strong mechanism for experiencing and expressing pain (Henare, et. al., 2003) so that clinical narratives have consistently shown that people who experience chronic pain, often

spontaneously present pseudo-imagery descriptions or actually report an experience of a mental image related to pain. In recent years, self-referential pain-related images have been considered by researchers and resulted in important findings. The results have shown that mental images lead to increase levels of pain more than verbal descriptions (Lonsdale, 2010); and the existence of a mental image related to pain is associated with higher anxiety and depression as well as higher catastrophe at emotional and cognitive levels, respectively (Gillanders et. al., 2012). In the study of (Philips, 2011) about the people with acute and chronic pain, 78% of people reported the experience of certain mental images associated with pain as well as more anxiety, anger, distress and pain intensity (acute and chronic) exposing to their pain images. Also, people with chronic pain show more reactions to their pain mental images compared to the people who suffer from acute pain (Philips, 2011).

The term of “mental images” refers to the recognitions that appear as a sensory experience in the absence of direct presence and external experience. A mental image can include any kind of sensory perceptions and thus can be visual, olfactory, hearing, taste, kinetic or tactile (Power and Dalglish, 2008). Self-referential (automatic) mental images usually enter to the mind inadvertently and annoying and have a living nature (Berna et. al., 2012). Studying mental image is not a new affair in clinical psychology. (Beck, 1976) has described verbal and visual incompatibilities as important psychological processes in emotional disturbances (Beck, 1976). Although there are discussions about the separated and distinct classification of mental images from verbal recognitions, it is generally agreed that these two are distinct phenomena (Pylyshyn, 2003; Kosslyn et. al., 2001).

Today, the methods based on mental imagination has become one of the most important components of cognitive treatments specially to change the mean related to emotional memories. Automatic images had mainly been considered in the area of stress disorder after accident (Ehlers & Clark, 2000); but the recent conducted studies had been focused on their role in types of psychological disorders such as anxiety and depression disorders (Ehlers & Clark, 2000; Arntz, et. al., 2007; Holmes et. al., 2007; Brewin et. al., 2009; Crane et. al., 2012, Wheatley et. al., 2007).

So far, the use of imagination in therapeutic interventions of pain has been mainly guided imagery to create positive images with the purpose of relaxation and reconstruction of existing mental images has not been taken into consideration. While the recent studies regarding automatic pain-related mental images contain valuable findings that include important therapeutic implications (Gillanders et. al., 2012; Gosden et. al., 2014; Berna, et. al., 2012; Carruthers et. al., 2009; Lonsdale, 2010; Philips, 2011; Philips & Samson, 2012; Philips, 2015; Kirkham et. al., 2015).

In the fear-avoidance model of pain by (Moseley, 2012), it is indicated that pain-related imagination created fear of pain and avoidance and verbal recognition like catastrophic thoughts along with visual cognitions are formed following fear. Catastrophe as a prediction of pain severity, psychological distress and pain-related disability has been identified even after controlling the effects of demographic variables and injury-related variables in patients with chronic pain and spinal cord injury (Turner et. al., 2002). Mental images play an important role in stimulation of negative emotions with pain which in turn causes a cognitive bias (Philips, 2015).

The theory of Interacting Cognitive Subsystem (ICS) (Teasdale, 1993) proposes two cognitive systems including implicit and propositional cognitive systems that are distinguished by overcoming of verbal processing and processing of images. Teasdale stated that concepts have a comprehensive and holistic nature in implicit cognitive system of information and are usually expressed through “metaphors, moral stories and narratives”. He referred to the role of “stimulated visual imagery” in this expressive way and frankly has been made such an argument that mental imagery is a very powerful method to present new elements and components to the implicit cipher pattern (Teasdale, 1997). This method can be used for cognitive reconstruction and correction of cognitive errors involved in pain experience and perception of pain intensity.

Based on that, (Asarian et. al., 2018) have designed and validated the intervention based on mental image of pain in accordance with therapeutic goals focused on pain perception for patients

with chronic pain. This protocol is affected by the visual methods described by (Edwards ,1990), (Smucker & Niederee ,1995), (Brewin et. al. ,2009), (Cooper ,2011), (Philips & Samson ,2012) and according to the studies of mental image of pain (Gillanders et. al., 2012; Gosden et. al., 2014; Berna et. al., 2012, Carruthers et. al., 2009, Lonsdale, 2010; Philips, 2011; Philips & Samson, 2012; Philips, 2015; Kirkham et. al., 2015) (Asarian et. al., 2018). The purpose of this study was to determine the effectiveness of mental image rescripting of pain on the intensity of perceived pain of patients with chronic pain.

2. Method

2.1. Design

An empirical study with control group, pre-test and post-test, with follow-up Population: Patients with chronic pain who referred to the Specialized Pain Clinic of Shahid Labafinejad Hospital in Tehran from February 2018 to August 2018 who were interested in participating in the research. It included patients with different types of chronic pain such as skeletal-muscle pain in legs, back, hands, arms, shoulders, neck, tension headaches and migraines, with a record of pain from 1 to 10 years.

Inclusion Criteria

- have been diagnosed with chronic pain by a pain specialist
- are adult (18 to 55 years old).
- live in Tehran

Exclusion criteria

Acute depression and psychosis: as noted in the patient's medical record (based on patients' self-report from his/her psychiatric record).

Sampling

Via random selection and sample size formula¹, 25 people were specified for each group.

2.2. Tools

Pain intensity. A Visual Analogue Scale (VAS) for pain was included to measure pain intensity, a validated and sensitive self-report measure, both electronically and in its paper form (Jamison, 2004), with good test-retest reliability (Bijur et. al., 2001). The line had a 0-100 sensitivity, with the 0 end anchored as 'no pain' and 100 as 'pain as bad as you can imagine'.

2.3. Implementation process

The determined individuals were invited to participate in this research by a phone call from researcher (therapist) and some receiving explanations. People who did not like to participate were substituted by next individuals and the participants were invited to interview. In the face to face interview, pre-test was performed to assess the intensity of their pain and obtain descriptive information of pain such as the main site of pain, pain duration, severity, cause, therapies and their effectiveness.

Then, semi-structured interview was conducted based on the therapeutic protocol for rescripting of mental image of pain (Asarian et. al., 2018) to discover simultaneous mental images and pain experience, image of pain index and qualitative and quantitative characteristics and meaning of pain image. 50 participants were randomly assigned in test and control groups. For the

$$N = \frac{2(Z_{\alpha/2} + Z_B)^2}{d^2}$$

test group, short-term treatment including 3 to 4 one-hour weekly sessions of rescripting of mental image of pain (Asarian et. al., 2018) was implemented.

Rescripting of mental image of pain was done by changing subsidiary qualities of image, then sensory displacement and finally manipulating the meaning and metaphor available in mental image during different sessions. By manipulating and changing several important subsidiary qualities such as proximity and distraction, color, clarity, view point, being stationary or animated, taking sound from the image and etc, without interfering with the image content was performed to reduce the emotional effect of mental image of pain. Also, sensory shift means that an experimental mental image is changed and translated from one sense to another among five senses that a sensory shift from a dominant and preferential sense (e.g. visual) to another visual system (e.g. audible sense) weakens the power and effect of mental image. Manipulation of latent meaning and cognitions in mental image was used in two main ways: 1- Background change: put the mental image in another background and texture so that its unpleasantness is eliminated or minimized. 2- Content change: the image is given another meaning. Also, the creation of positive pain-related mental images was done aimed to increase self-efficacy, enhancing welcoming and compassionate attitude, positive interpretive bias, and facilitating relaxation and so on.

In reconstruction phase, the therapist avoids to highly interfere and present certain instructions which are actually the mental images of therapist and not belonged to the visitor, so that visitor feel belonged to the new mental images which creates that means these new mental images are "his/hers" and fully complete the details of new image.

The follow-up was done on the sixth week after the end of intervention. The drop in subjects (4 cases) was compensated by the replacement of new participants. The evaluation of control group was performed in three phases with the same time interval like test groups.

2.4. Ethical considerations

Written informed consent was obtained from the participants after they were assured of confidentiality of information and the right of participants to leave the research whenever they wish. After the follow-up stage, the control group went under the same treatment that the experimental group had.

3. Results

Descriptive

The age of the participants was between 22 and 55 years old and the mean age was 42.7 years. The demographic and descriptive characteristics of the participants in (Table 1) are visible.

Table 1. descriptive and demographic characteristics

Variable		Experiment	Control
Gender	Female	72	80
	Man	28	20
Marital	single	6	2
	married	15	21
	widow	4	2
Education	illiterate	6	7
	diploma	10	13
	BA	9	5

	MD&PHD	0	0
Job	employed	11	9
	housewife	11	12
	unemployed	3	4
Area of Pain	head	6	6
	neckhand	4	4
	feet	7	7
	back	4	2
	more2main	4	6
Baground	Under 1year	5	6
	Under 5year	12	8
	Under 10year	6	9
	more	2	2

(Table 2) shows the mean and standard deviation (SD) of severity of pain, distress, and activity avoidance in the two groups.

Table 2. Mean and SD of the variables

Variable	Evaluation	Experiment (SD) Mean	Control (SD) Mean
Pain Intensity	Pre-test	4/04(1/20)	4/12(1/16)
	Post-test	2/00(1/08)	4/08(1/15)
	Follow-up	2/16(0/94)	4/16(1/14)
Distress	Pre-test	5/60(1/63)	5/48(1/61)
	Post-test	1/56(1/38)	5/32(1/60)
	Follow-up	1/88(1/39)	5/68(1/63)
Activity Avoidance	Pre-test	8/08(2/17)	7/72(2/85)
	Post-test	5/76(2/06)	7/80(2/38)
	Follow-up	5/68(1/97)	7/80(2/41)

Inferential

Mixed between-within subjects analysis of variance was conducted to test the hypothesis, which is the extended from of repeated measure design. Normality assumption was examined, where the results showed the normality of data distribution ($P < 0.05$). The result of the M box test is significant (Box's $M = 20.32$, $F = 3.157$, $df_1 = 6$, $Sig. = 0.004$) showing lack of homogeneity assumption of the covariance matrix between the variables. Nevertheless, in case of equality of the size of the groups, it is not necessary to observe this assumption and the statistics of the Pillai's Trace are intact.

Table 3. Multivariate Tests

Effect	Value	Hypo. df	F	Sig.	Eta Squared	Power
Pillai's race	0.724	2.000	61.561 ^b	0.000	0.724	1.000

According to the (Table 3), there is a significant difference between the total changes of the three periods in the two groups ($P = 0.001$). Accordingly, the intervention explains 72.4% of the variance of the severity of pain.

The results of Mauchly's test denoting the homogeneity of variance of the difference scores show that it is insignificant (Mauchly's $W = 0.914$, $df = 2$, $Sig. = 0.122$). Thus, this assumption exists. Therefore, the result of repeated variance analysis was interpreted (Tables 4 & 5).

Table 4. Tests of Within-Subjects Effects

	SS	df	MS	F	Sig.	Eta Squared	Power
Sphericity Assumed	32.053	2	16.027	67.166	0.000	0.583	1.000

Table 5. Tests of Within-Subjects Contrasts

	SS	df	MS	F	Sig.	Eta Squared	Power
Level 1 vs. Level 2	50.000	1	50.000	120.482	0.000	0.715	1.000
Level 2 vs. Level 3	0.080	1	0.080	0.200	0.657	0.004	0.072

As is seen, the difference between the three stages changes in the two groups is significant ($P = 0.001$), meaning that the intervention to rebuild the mental image of pain has significantly affected the pain reduction of the participants. Pretest and posttest changes in the two groups are significant ($P = 0.001$). Accordingly and based on the comparison of the meanings (Table 2), the intervention explains 71.5% of the variance of the pre-test and post-test differences in pain severity. Comparison of post-test and follow-up stages showed no significant differences in the two groups in (Figure 1).

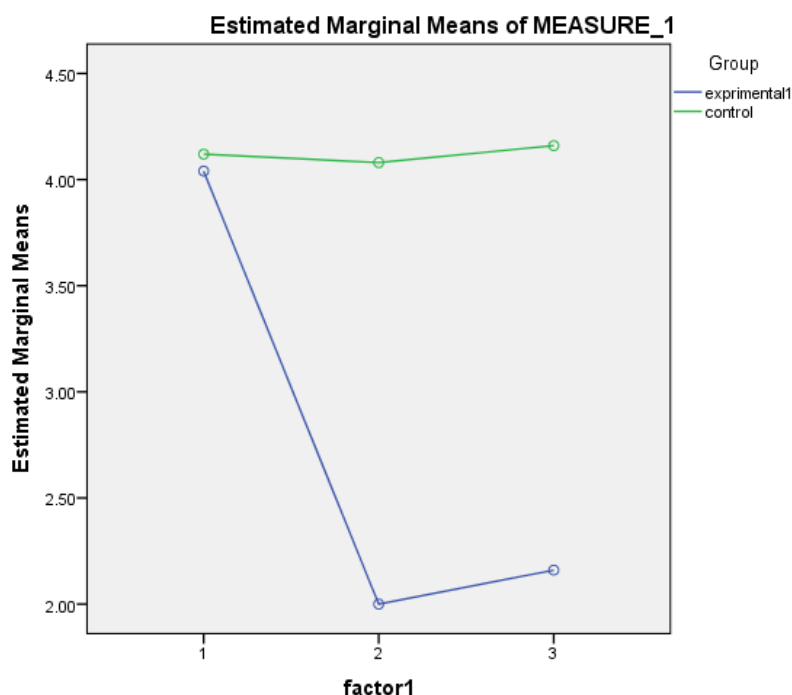


Figure1. The mean score of pain intensity in three stages separately for the experimental and the control groups

4. Discussion

The results of this study are consistent with many studies that have confirmed the reduction of clinical pain through cognitive manipulation and revised and confirmed in reviewed studies (Richmond et. al., 2015; Giacobbi et. al., 2015; Macea et. al., 2010; Harris et. al., 2015). Philips and

Samson (2012) have confirmed the immediate effects of manipulating mental image of pain on pain reduction which was done only by creating change in sensory quality of change. (Luria & Bruner ,1987) had described a great example of change of sensory quality to eliminate pain or a significant reduction of it, in a case study. The present study provides the preliminary data on the effectiveness of manipulating mental image of pain on the intensity of perceived pain of patients with chronic pain.

Pain images are a fast way to achieve distorted cognitions which are focused in CBT. Pain images have a high correlation with weak and vulnerable beliefs about themselves and the likelihood of misfortune and threat about the future (Philips, 2011, 2015). Also, many of pain mental images reflect misunderstanding about the mechanism of pain in the body or include implicit beliefs about the reason, consequences and prognosis of pain. These beliefs can lead to cognitive bias. Access to pain beliefs through the available clues in mental images in cognitive therapy of chronic pain is very important. Especially, since it is difficult for patients with chronic pain to access the beliefs through the use of questionnaire and most of patients are not able to report their pain beliefs, directly. Therefore, manipulation of pain images has provided the possibility of correcting cognitive errors, predictions and catastrophic beliefs of patients.

Limitations

The population studied in this research included patients who had come to receive medical services and are often the people who believe in the causes and medical treatment of pain than self-management and psychological factors. Against, given that medical services are currently presented only in pain clinics, a part of population with chronic pain do not go to these clinics. So, the population under this study may not be the representative of the total population of patients with chronic pain, nevertheless represents a clinical one.

Research suggestions

Earlier, the only study about the effect of manipulating mental image of pain was the study of (Philips & Samson ,2012) that showed remembering the new image significantly reduced the severity of pain, distress and threat assessment compared to the control group. Due to the manipulation of image on that study was very similar to the guided mental imagery and attention-shift homework, it was not possible to conclude that the experimental effects have come from what process. The findings of this study confirm the effects of cognitive reconstruction against attention deviation. The future studies can focus on more clarifying the mechanism of the effect of cognitive reconstruction and its long-term effects.

Clinical suggestions

- A self-help tool: Mental imagery lead to enhance self-management of chronic pain within that the person promote his/her ability to participate in reducing pain and managing chronic pain. Self-management strategies play a very important role in experiencing chronic pain (Turk & Okifuji, 2002). Rescripting of mental images is one of the effective tools which is used by people with chronic pain to manage their conditions and learn to perform this process in the absence of a clinical specialist.
- Use in pain management programs: The applicability of this intervention, is the most important dimension of its success. It is clear that the level of benefit to medical patients including patients with chronic pain, from psychological intervention is very low. Mental obstacles and impatience of patients suffering from pain, interdisciplinary gaps, the presence of resistance for receiving psychological interventions and the cost of taking a full-time psychotherapy are involved in it. To overcome these obstacles and save time and cost, short-term psychological interventions with limited purposes which can be performed for most of the people and are able to be easily combined with medical and physical therapy programs of patients with pain, are useful. Validation of the rescripting of pain mental image (Asarian

et. al., 2018) has made its optimal application easy. Other studies also confirmed the ease and attractiveness of this method attract people to mental imagery interventions. (Carruthers et. al. ,2009) indicated that 90.7% of participants reported that using mental imagery in treatment is helpful and effective. (Elomaa et. al., 2009) have introduced mental imagery as one of the three most popular strategies in managing pain (two other strategies are relaxation and attention deviation to external objects).

5. Conclusion

By extracting pain-related mental images, the most painful dimensions of patient's pain can be expressed and discovered and by reconstructing the image, that pain can be changed to a more tolerable one. Various levels of manipulation include emotional changes to cognitive construction and it seems that it can reduce the patients' pain, significantly. Rescripting of pain mental image can be put in pain management programs as a commonly used intervention along with two current popular strategies-relaxation and attention deviation- and patients can use the benefits of cognitive reconstruction and taking adaptive cognitions to pain easier.

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