



The Effect of Acceptance and Commitment Therapy on Psychological Flexibility and Emotional Regulation in Patients with Spinal Cord Injuries: A Randomized Controlled Trial

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Abstract

Background: Patients with spinal cord injuries suffer from some psychological problems, such as inadequate emotional regulation and flexibility for adapting to the post-injury condition. In this regard, acceptance and commitment therapy (ACT) can improve psychological flexibility and emotional regulation.

Objectives: The main goal of this study was to analyze the effectiveness of ACT in improving psychological flexibility and emotional regulation in patients with spinal cord injuries.

Methods: This quasi-experimental design study was based on a pretest-posttest method with a control group. The study population consisted of all patients with spinal cord injury referred to Jalaiepour Rehabilitation Center in Tehran. The study sample included 30 patients with spinal cord injury selected by the purposive sampling method. The inclusion criteria were patients aged 20 to 55 years, residing in Tehran, and with at least a high school diploma. The injury duration varied between one and five years, and the injuries were thoracic and lumbar injuries and an intermediate score of psychological flexibility and emotion regulation. The exclusion criteria were patients with cervical spinal cord injuries, as well as patients who were simultaneously receiving another psychological treatment together with the subjects who suffered from brain damage. Patients were randomly assigned to the experimental and control groups based on random numbers. There were 15 patients in each group. The intervention group received ACT during eight sessions (1.5-hour group therapy) held once a week at Jalaiepour Rehabilitation Center in Tehran (2018), while the control group received routine care. Dennis and Vander Wal's cognitive flexibility inventory (CFI) and Gross and John's emotion regulation questionnaire (ERQ) were completed before and one week after the intervention. The data were analyzed using multivariate analysis of covariance (MANCOVA).

Results: There was a significant difference in demographic indicators between the two groups. Based on MANCOVA with the baseline score, the mean scores of psychological flexibility and emotion regulation had a significant difference regarding the results of ACT between the experimental and control groups ($P < 0.05$).

Conclusions: According to the findings, ACT can improve psychological flexibility and emotional regulation in patients with spinal cord injuries.

Keywords: Acceptance and Commitment Therapy, Emotional Regulation, Spinal Cord Injuries

1. Background

Despite the considerable success obtained by modern humans in different areas, accidents and injuries originating from the current conditions in modern life are inevitable. These accidents and injuries can cause irreversible damage regardless of their causes. We sometimes refer to these injuries as diseases or chronic disorders (1). Spinal cord injuries are examples of these disorders. A pa-

tient with spinal cord injury is a person whose spinal cord is injured from below the medulla oblongata to the end of the cauda equina, which is protected by the vertebral column. In fact, the closer the injury is to the brain, the higher the level and severity of the spinal cord injury are (2). The average global rate of spinal cord injuries varies between 20 and 50 patients a year (3). Car accidents, occupational accidents, natural disasters, and social conflicts (such as wars) are among the factors that may cause transient or

permanent disabilities due to spinal cord injuries (4).

As stated, a spinal cord injury can arise from many factors. However, regardless of its cause (s), a spinal cord injury has deep and considerable effects on the physical and psychological health and lifestyle of the patient (5). Experts suggest that there is no certain treatment for neural lesions in patients suffering from spinal cord injuries (6). Spinal lesions are among the problems that the rehabilitation team tries to solve due to the lack of specific treatments. Recently, rehabilitation has been mainly revolving around physical rehabilitation; however, the mental health of these individuals has not garnered enough attention. As the motor and physical problems of these patients are being recognized in the area of rehabilitation, their psychological problems, including their psychological rehabilitation, calls for more attention (7).

Psychological inflexibility is one of the factors that cause psychological complications in chronic diseases (such as spinal cord injuries) and are taken into account in their psychological rehabilitation. Psychological flexibility is a unique function, prominent trait, or general cognitive ability enabling the individual to accept multiple ideas, change their understanding flexibly, and provide normal responses to environmental or pattern changes. Individuals with psychological flexibility use alternative explanations, positively reconstruct their intellectual framework, and accept challenging or stressful situations (8). In other words, individuals with psychological flexibility adopt more appropriate and adaptive emotional regulation strategies (9). Emotional regulation refers to strategies that can influence the degree and duration of the increase in emotions, their duration, and experience and expression of these emotions (10). Moreover, emotional regulation refers to the process by which individuals influence which emotions they have, when they have them, and how they experience and express their feelings. Emotional regulation can be automatic or controlled, conscious or unconscious, and may affect one or more points in the emotion production process. In other words, emotion regulation is the ability to exert control over one's emotional state. It may involve behaviors such as rethinking a challenging situation to reduce anger or anxiety, hiding visible signs of sadness or fear, or focusing on reasons to feel happy or calm (11). Patients with spinal cord injuries experience more emotional regulation problems than healthy individuals (12). In general, psychological inflexibility hinders emotional regulation (13). Regarding the psychological rehabilitation treatments designed to reduce inflexibility, several treatments have been employed in the literature (14). The mechanism of the effectiveness of these treatments is indirect. Considering the fundamental assumptions for each treatment, each one has led to a decrease in psychological inflexibility as an

outcome rather than a direct impact, according to reports. In other words, these treatments did not intervene with flexibility. In turn, they modified factors such as problem-solving, cognitive distortions, and mindfulness. By changing these factors, psychological inflexibility decreased as an outcome rather than a direct impact. One of the psychotherapeutic methods designed for the rehabilitation of these patients is acceptance and commitment therapy (ACT) (15). This psychotherapeutic method directly focuses on improving psychological flexibility by virtue of its fundamental philosophy. Seemingly, ACT is suitable for treating inflexibility and emotional regulation because the fundamental philosophy of this approach revolves around reducing psychological inflexibility and the experience of emotions (16). In other words, preventing experiential avoidance is the core of ACT. This principle aims to teach the patients how to quit the idea of suppressing anxiety, how to detach from unwanted, disturbing thoughts, and how to experience unpleasant emotions instead of avoiding them (17). Moreover, ACT helps one to accept that a healthy person is not someone who does not have unpleasant emotions, but a healthy person is someone who can manage these emotions and experience a kind of life and accompany these emotions and practices such as mindfulness helps the person to exercise being with such emotions. This is an indirect process of ACT that works on emotions, which seems to be similar to the emotion regulation skill process.

The literature has shown that ACT has a positive effect on psychological flexibility and emotional regulation in different statistical communities. According to some studies, ACT plays an important role in the treatment of patients with obsessive-compulsive disorder (OCD) by increasing psychological flexibility (18). Another study used acceptance, commitment, and focus on psychological flexibility to help control weight (19). In addition, ACT has been used for emotional regulation in patients with breast cancer (20). The results have shown an increase in emotion regulation. Also, in another study, the use of this method in improving emotional regulation has been confirmed in dental patients (21). Considering the effects of ACT on these variables in similar chronic diseases, it seems that considering the problems of patients with spinal cord injury in psychological flexibility and emotional regulation, we will examine the effects of ACT on these variables in these patients.

2. Objectives

This study aimed to determine the effectiveness of ACT in psychological flexibility and emotional regulation in patients with spinal cord injury.

3. Methods

3.1. Population and Design

This study was a clinical trial performed on spinal cord injury in Jalaiepour Rehabilitation Center, Tehran, Iran (from July to December 2018). The study population consisted of all patients with spinal cord injury referred to this center. This quasi-experimental design study was based on a pretest-posttest method with a control group. The Ethics Committee of the University of Social Welfare and Rehabilitation Sciences (ID: IR.USWR.REC.1397.019) approved this study, which was registered at the Clinical Trials Center (ID: IRCT20180710040411N3) and coordinated with Jalaiepour Rehabilitation Center in Tehran to conduct the study. Then, the intervention group received ACT during eight sessions (1.5-hour group therapy) held once a week, while the control group received routine care. Dennis and Vander Wal's cognitive flexibility inventory (CFI) and Gross and John's emotion regulation questionnaire (ERQ) were completed before and one week after the intervention.

3.2. Sampling

The study sample included 30 patients with spinal cord injury selected by the purposive sampling method. The sample size was calculated using Cochran's formula. The inclusion criteria were patients aged 20 to 55 years, residing in Tehran, and with at least a high school diploma. The injury duration varied between one and five years, and the injuries were thoracic and lumbar injuries and an intermediate score of psychological flexibility and emotion regulation. The exclusion criteria were patients with cervical spinal cord injuries, as well as patients who were simultaneously receiving another psychological treatment together with the subjects who suffered from brain damage. Accordingly, none of the 69 patients, who met the inclusion and exclusion criteria, were excluded from the study. However, according to the sample size required for group interventions, 30 patients were selected based on their medium downward score of psychological flexibility and emotion regulation to participate in the study and were randomly divided into two groups of 15 controls and 15 intervention subjects (Figure 1).

3.3. Randomization Process

The patients were randomly assigned to the experimental and control groups based on random numbers. Each patient was assigned a random number. Then, the lottery was conducted by a person outside the study by picking numbers from the envelope. Patients were included in the experimental or control groups one by one. There were 15 patients in each group.

3.4. Intervention Protocol

Eight sessions (1.5-hour group therapy) were held once a week for the experimental group (15 subjects) based on Twohig's protocol (22). The content of the intervention was presented as a training class by the corresponding author at the training hall of Shahid Jalaiepour Spinal Cord Injury Rehabilitation Center. These sessions are summarized in Table 1. Posttest was conducted one week after the intervention. During this time, no intervention was performed on the control group.

3.5. Study Questionnaires

Questionnaires used in this study were demographic index, CFI, and ERQ. The demographic index included questions about age, education, occupation, gender, and marital status. CFI was developed by Dennis and Vander Wal (2010) (23). This 20-item scale is composed of three sections: the ability to control difficult situations as a comprehensible situation, the ability to consider alternative methods for different life situations, and the ability to consider different solutions to difficult situations. The items are ranked based on the 7-point Likert scale as from fully disagree [1] to fully agree [7]. Questions 2, 4, 7, 9, 11, and 17 are ranked in reverse. The highest and lowest scores are 140 and 20, respectively. The convergent validity of this scale is 0.75, and its reliability is 0.91, according to Cronbach's alpha coefficient. In this study, the Persian version of this scale was used. In Iran, Shareh et al. obtained a retest reliability coefficient of 0.71 for the entire scale and reported a Cronbach's alpha coefficient of 0.90. Moreover, the factor validity, convergent validity, and concurrent validity of this scale were satisfactory in Iran (24).

ERQ was introduced by Gross and John (2003) (25). This scale consists of 10 statements presented through two subscales: the reappraisal subscale (six statements), which includes questions 1, 3, 5, 7, 8, and 10, and the suppression subscale (four statements), which includes questions 2, 4, 6, and 9. The answers are ranked based on the 7-item Likert scale from fully disagree [1] to fully agree [7]. The minimum and maximum scores are 10 and 70, respectively. Scores ranging from 10 to 27 show poor emotional regulation. Scores between 27 and 40 show moderate emotional regulation, and scores above 40 show strong emotional regulation. The Cronbach's alpha coefficient for the reappraisal and suppression sections was 79% and 73%, respectively. The posttest validity of the entire scale after three months was 69%. The internal consistency coefficient obtained by Gross and John for the reappraisal section using state employees and catholic students at the University of Milan varied from 0.48 to 0.68, while it varied between 0.42 and 0.63 for the suppression subscale. The Persian version of this scale was used in the present study. The validity of this scale was satisfactory using the internal consistency

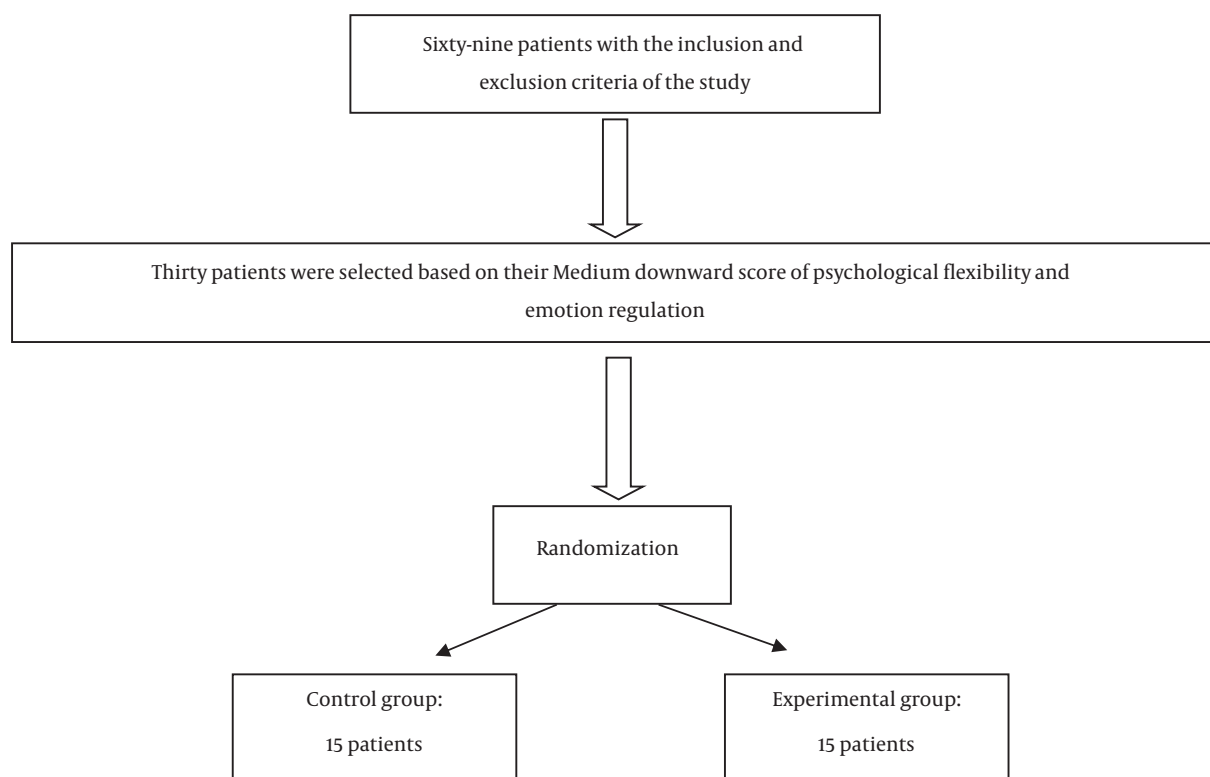


Figure 1. The flowchart of the study

Table 1. ACT Protocol

Session	Protocol
1	Introducing and communicating with the group members; explaining the general rules; and distributing the questionnaires
2	Discussing and assessing the experiences of spinal cord injuries; employing the "person in the well" metaphor; and invoking creative despair
3	Stating control as the problem in controlling the disabling effects of spinal cord injuries; employing the ball in the pond metaphor; assigning the task of identifying the controlling behaviors
4	Reviewing behavioral tasks and commitment; introducing defusion; employing cognitive defusion techniques; employing the lemon slice metaphor; employing detachment from thought methods; assigning the task of measuring attachment to the thoughts linked to the spinal cord injury
5	Reviewing behavioral tasks and commitment; considering self to be the context (self as context) and the spinal cord injury as a complication and problem that is separate from us; expressing one's self as the observer; exercising the separation of one's self from the spinal cord injury, inner experiences, and behaviors
6	Using the mindfulness techniques; introducing "the conflict between experience and the mind; modeling detachment from the mind; learning how to consider inner experiences as a process; implementing the mindfulness technique by eating raisins
7	Introducing the notion of value, discovering the scientific values of life before, during, and after the spinal cord injury
8	Understanding the essence of tendency and commitment; identifying the action patterns in proportion to the inner values identified despite spinal cord injuries; acting based on these patterns; summarizing

method (Cronbach's alpha score is between 0.60 and 0.81). Also, the validity was satisfactory. The use of varimax rotation (for analyzing the main component) showed a correlation ($r = 0.13$) between the two subscales.

3.6. Analysis Method

Statistical Package for the Social Sciences (SPSS) version 21 (SPSS Inc., Chicago, Ill., USA) was used to analyze the data. The Kolmogorov-Smirnov method was used to confirm the normality of the data. A chi-square test was used to evaluate the homogeneity of demographic indicators in two groups. The mean and standard deviation (SD) indices were used in the descriptive section. Moreover, multivariate analysis of covariance (MANCOVA) was used after the intervention in the inferential statistics section.

4. Results

Based on patients' demographic indicators, no difference between the experimental and control groups (Table 2). Also, descriptive statistics data are presented in Table 3. Finally, results showed that ACT increased psychological flexibility and emotional regulation in the experimental group ($P < 0.05$). The two groups were compared using MANCOVA to determine the difference between psychological flexibility and emotional regulation. The results of the MANCOVA analysis are listed in Table 4.

As shown in Table 4, using the (MANCOVA) analysis method and removing the pretest effects, the moderated mean for psychological flexibility with ($F = 33.46$) and ($P = 0.005$) and the moderated mean for emotional regulation with ($F = 28.90$) and ($P = 0.005$) were significant. This indicated the effectiveness of ACT in improving psychological flexibility (with effect size: 0.614) and emotional regulation (with effect size: 0.579) in patients with spinal cord injury.

5. Discussion

The results confirmed that this method had a positive effect on increasing psychological flexibility and emotional regulation scores during eight weeks of intervention compared to the control group.

According to the findings of this study, it could be stated that cognitive fusion is among the factors associated with psychological flexibility. Cognitive fusion is one of the most important mechanisms for the effectiveness of ACT. Moreover, fusion occurs when the individual's thoughts affect their behaviors, which makes them switch their attention from the thinking process (the context) to the thinking products (the content). When this process dominates the individual's experience, it leads to

psychological flexibility (26). Hence, it seems that this psychotherapeutic method sets the scene for an increase in the flexibility of patients with spinal cord injury by reducing this fusion. In addition, patients with psychological flexibility are less prone to stigmas (27). Since patients with spinal cord injuries often suffer from stigmas in society, and the stigma is established as a thought and a belief in their minds, it results in cognitive fusion. Seemingly, the ACT approach in this study regulated cognitive fusion, thereby enabling the patients with spinal cord injury to more easily accept the stigma and injury-related conditions. Moreover, people with psychological flexibility are less affected by painful emotional schemas. Schemas are forms of thoughts that are transformed into core beliefs (28). If patients with spinal cord injury have such early painful schemas, this psychotherapeutic method might reduce the effect of these painful schemas using techniques such as cognitive detachment, which sets the scene for the emergence of psychological flexibility. Besides, the research results suggest that psychological flexibility has a significant relationship with self-efficacy. ACT probably improved the self-efficacy of the patients with spinal cord injury using techniques such as self as context and commitment to action in line with the values (29). In other words, an improvement in self-efficacy results in the sense of ability, positive emotions, increased self-confidence, identification and enhancement of abilities, openness to new experiences, and purposefulness. These positive mechanisms also affect psychological flexibility. Another finding is that psychological flexibility fosters hope (30). Psychological flexibility refers to the ability to take into account multiple options, and the degree of hope is higher with multiple options than with few options. Hence, ACT may help patients with spinal cord injury accept an experience, take into account several options based on their values, and increase their hope. Consequently, psychological flexibility is also improved (31). The findings of this study are in line with other studies. For example, a study conducted by Moghtadai showed that ACT improved the psychological flexibility of the disabled veterans' spouses (32). Also, our findings are in line with the study by Hulbert, who reported that ACT was effective in increasing the psychological flexibility of cancer patients (33).

Regarding the above-mentioned findings, as ACT reduced stress, the patients abandoned their useless efforts to control and experiential avoidance and accept their thoughts and feelings as an alternative solution. Patients with spinal cord injury had an extreme reaction to the problems they faced, and instead of focusing on balance and moderation, they realized their thoughts and feelings and magnified the issues. Having a balance between expressing emotions and reacting rationally to stress is a goal that is also pursued in emotional regulation (34).

Table 2. Comparing the Research Demographic Variables in the Experimental and Control Groups

Variable	Experimental, No. (%)	Control, No. (%)	P-Value
Education			0.73
Diploma	4 (26.6)	3 (20)	
Bachelor	7 (46.6)	8 (53.3)	
Master and higher	4 (26.6)	4 (26.6)	
Age			0.14
20 - 30	3 (2)	3 (20)	
31- 40	6 (40)	7 (46.6)	
41 - 55	6 (40)	5 (33.3)	
Gender			1
Male	7 (46.6)	8 (53.3)	
Female	8 (53.3)	7 (46.6)	
Marital status			0.7
Married	11 (73.3)	10 (66.6)	
Not married	4 (26.6)	5 (33.3)	
Job			0.06
Unemployed	7 (46.6)	8 (53.3)	
Employed	8 (53.3)	7 (46.6)	

Table 3. The Descriptive Statistics of Psychological Flexibility and Emotional Regulation Variables Before and After the Intervention in the Experimental and Control Groups^a

	Control		Intervention	
	Pre-test	Post-test	Pre-test	Post-test
Psychological flexibility	61.76 ± 17.92	68.84 ± 17.47	55.73 ± 10.41	100.20 ± 11.82
Emotional regulation	27.92 ± 8.76	26.76 ± 8.23	23.93 ± 6.83	47.53 ± 9.84

^a Values are expressed as mean ± SD.**Table 4.** MANCOVA of the Difference Between the Experimental and Control Groups Regarding the Psychological Flexibility and Emotional Regulation Variables

	Sum of the Squares	df	MS	F	P-Value	Eta Coefficient
Psychological flexibility						
Pre test	741.350	1	741.350	3.76	0.066	0.152
Group	6594.357	1	6594.357	33.46	0.005	0.614
Error	4137.664	21	197.032	-	-	-
Emotional regulation						
Pre test	177.520	1	177.520	2.405	0.136	0.103
Group	2132.940	1	2132.940	28.90	0.005	0.579
Error	1549.846	21	803.73	-	-	-

It can also be said that patients with spinal cord injury had very little patience and endurance against the issues, which made problems and difficulties more pronounced for them. ACT has helped these patients through defusion exercises interrupt this vicious circle and break down the threatening state of these thoughts. Therefore, it seems

that the patience of these subjects has increased, and patience is one of the bases of emotional regulation, so that emotional regulation has also increased. Some studies have also suggested a relationship between perceived disability and emotional regulation in patients with spinal cord injury (35). It seems that ACT has helped these pa-

tients modify their perception of disability through techniques such as discovering intrinsic values and committing to practice based on those values. In other words, by acting according to their values, the perception of the disability of these people has changed in a positive direction. As a result, emotional regulation is increased.

This finding is in line with some other studies. For example, Yaraghchi studied the effect of ACT on weight loss and emotional regulation in obese individuals (36). Also, Boostani studied the effectiveness of ACT on the difficulty in emotional regulation in patients with essential hypertension (37). This study is one of the first intervention studies for psychological flexibility and emotional regulation in patients with spinal cord injury. However, the limitations of this study are as follows: this study is not blinded and limited to patients with lumbar and thoracic spinal cord injuries without a placebo group.

5.1. Conclusions

Acceptance and commitment therapy (ACT) has a positive impact on psychological flexibility and emotional regulation in patients with spinal cord injury, which can help them in psychological rehabilitation. It is recommended to study the effect of ACT on patients with cervical spinal cord injury.

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Footnotes

Authors' Contribution: Conceptualization: Jalal Younesi; Methodology: Asghar Dadkhah; Data collection: Banafsheh Ebrahimi; Data analysis: Akbar Biglarian; Supervision: Mohammad Saeed Khanjani.

Clinical Trial Registration Code: The clinical trial registration code was IRCT20180710040411N3.

Conflict of Interests: The authors declare that there is no conflict of interest.

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Informed Consent: Written informed consent was obtained from eligible patients in their native language (Persian).

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