

## The efficacy of stress incultation training (SIT) on resilience, anxiety, depression and stress among spinal cord injury (SCI) patients

Hasanzadeh Pashang S<sup>\*1</sup>, Zare H<sup>1</sup>, Alipor A<sup>1</sup>

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1. Dept. of Psychology, Payam Nour University, Tehran, Iran

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### Abstract

#### Introduction:

Depression, anxiety and stress are common problems among spinal cord injury patients because of their routine problems in leading their life. So, the main aim of this study was determining the effect of stress incultation training (SIT) on the rate of resilience, anxiety, depression and stress in these patients.

#### Materials and Methods:

This is a quasi-experimental research on 32 spinal cord injury patients in Tehran. The type of their spinal cord injury was paraplegia and five year had passed from their spinal cord injury; the cause of their injuries was car accident and their age ranged from 23 to 36 years. The patients were randomly divided into two experimental and control groups. After the participants filled out the questionnaires of Conner Davidson and DASS-21, stress incultation training (SIT) was provided to the experimental group for 8 sessions, each lasting 90 minutes. Then, both experimental and control groups complete the questionnaires again. The data were analyzed using Co-variance (Ancova).

#### Results:

The results showed that stress incultation training increased the resiliency among spinal cord injury patients ( $P \leq 0.048$ ). Stress incultation training reduced the rate of depression ( $p \leq 0.046$ ) and stress ( $P \leq 0.022$ ) among spinal cord injury patients. However, stress incultation training did not change the rate of anxiety among spinal cord injury patients ( $P \leq 0.473$ ).

#### Conclusion:

It is concluded that SIT plays an important role in increasing the rate of resiliency and reduces the rate of depression and stress among spinal cord injury patients

**Keywords:** Spinal Cord Injury, Patients, Psychological Resilience, Depression, Anxiety

#### Introduction:

Inevitable, along with great successes of modern man and circumstances of life in industrial societies, are accidents and injuries. A consequence of life-style in these societies is spinal cord injury (SCI) mainly due to traffic accidents, occupational accidents, or sports.

One of the most dangerous physical damages is spinal cord injury that may impair many body systems or even be life-threatening (1). In accordance with resolution 96/48 of the UN General Assembly in December 1993, people with spinal injury are regarded as disabled (2). Spinal injury disabled is referred to a

\* Corresponding author, Address: 1<sup>st</sup> Floor, No. 10, Alley 1, Jahad Akbar St, Payambar Gharbi St, Tehran, Iran  
Tel: +98 919 6420315  
Email: hasanzadeh60@yahoo.com

person whose spinal cord has been damaged from below the medulla oblongata to the lumbar ends network with partial or complete disconnection, crushed, or transformation changes due to impact, brain tumor or cancer, Cerebro-Vascular diseases, or even advanced stages of Discopathy, resulting in motor or sensory complications or autonomic complications of one or more limbs or torso (3). Should the injury occur in the lower chest area the person becomes paraplegic, and if it occurs in the cervical spine, it will lead to Tetraplegia or Quadriplegia (paralysis of all four extremities). In fact, the closer the injury is to the brain, the greater the level and severity of spinal injury (4).

The first study on patients with spinal cord injury was done by Sir Ludvick Guttmann (4), and 5000 years ago, ancient Egyptian surgeon Edwin Smith Papyrus examined six patients with spinal injury and decided they were incurable (1). Also, 150 B.C, Vuglan stated that although these patients cannot be cured, nevertheless, they should be supported psychologically (2).

Prevalence of spinal cord injury has been reported 15 to 40 million people by the World Health Organization, and 12 to 40 million people suffer spinal cord injury annually (5, 6). Currently three million disabled people have been identified in Iran, and given high levels of accidents and incidents, it is estimated that the existing 700000 spinal injury disabled people will increase by 2000 annually (5). In the United States, for every one million people, 30 to 40 new cases of spinal injury incidents are added each year, and half of them have received their injuries in road accidents and a quarter are completely paraplegic. According to Tehran University 2100 war veterans are with spinal cord injuries (7). Spinal injuries mainly occur in young people, and over half (53%) cases are aged 16 to 30 years. Spinal injury is more common among young and active men, with men to women ratio of 4 to 1, reducing to 5 to 1 in younger groups (8).

As discussed earlier, whatever the cause of spinal injury may be, it profoundly affects life-style and physical and psychological health of the injured person (9). The injured person becomes socially isolated and aloof and eventually depressed due to stresses caused. Depression is a mood disorder accompanied by low self-esteem, feeling of inadequacy, lack of self-sufficiency, and unfavorable self-impression. It is a painful experience that depends either on a violent blow or expectation of coming danger from an unknown source (10). Compared with ordinary people, physically disabled are less socially active and prefer social isolation (11). According to Martz et al, compared with sociable people, they run a very high risk of developing mood disorders (12). According to Digross, psychological adjustment with spinal injury is much harder than physical adjustment, as the injury is caused suddenly and requires time for psychological adjustment (13). The special conditions of these people, deeply affect their mental status and their relationship with family and society, and impair their socio-psychological adjustment and mental health (14). Of course, more than the injury, personal characteristics affect psychological complications and different people react differently to these pressures. Some people can cope better with these stressful conditions than others. Others, due to weaknesses in character, are less resistant, and less resilient in coping with mental pressures (15). Resilience is defined as the ability to act effectively and actively instead of being reactive and subjective (16). Responses in the forms of thoughts, emotions, and actions for dealing with problematic situations define stress coping strategies that people adopt (17). In other words, coordinating behaviors to meet peripheral needs often require modification of behaviors, emotions, and motivations (18). Erin Martz et al, while investigating psycho-social adjustment predictors, found a significant correlation

between low adjustment level and negative emotional responses such as; depression, anxiety, stress coping strategies, and severity of disability in people with spinal injury (12). Nosk et al also found that compared with ordinary people, disabled are more socially isolated and depressed and have less intimate relationships (19). Study by Jonmohammadi et al showed 7 to 14% males and 20 to 26% females with spinal injury are at high risk of severe depression (20), and Kennedy and Rogers reported prevalence of depression in these people 30 to 40% and prevalence of anxiety disorder 20 to 25% (21). Carriage has estimated that depression and anxiety remain for two years after the injury incidence in 30% of injured people (22). Crow also expressed that the psychological effects of spinal injury reaches maximum in the first five years, and in the first few years they have highest ability to recognize the loss incurred due to their disability (23). Therefore, in the first five years, people with spinal cord injury are at high risk of committing suicide (24). Moghadam et al identified suicide as cause of 6 to 10% of deaths in people with spinal injury, thus, these people must never be assumed incapable of committing suicide just because they are disabled (9). Charlie and Gerhard estimated that suicide rates in people with spinal injury are 3 to 5 times more than in ordinary people. Attempts for speedy return of these people to active and normal life and prevention of physical and psychological complications due to spinal injury, play a vitally important role in their lives (25).

Considering the importance of the subject, this study aims to teach effective methods of coping with stress to people with spinal cord injury, so that they can take control of their lives, or re-write the scenario of their lives according to their abilities (26).

### Materials and Methods:

This study was a semi-trial intervention. The statistical population included all spinal injury patients in Tehran (2000

patients) that had records at spinal injury support center. 40 patients (20 male, 20 female) aged 23 to 36 years with paraplegia due to spinal cord injury traffic accidents were selected and divided into two trial and control groups according to Morgan table. Eventually, 32 patients (equal number of males and females) remained committed to the study to the end. The reasons for drop in numbers were; hospitalization of some due to infectious bed sores, distance, and interference of training sessions and physiotherapy times. Exclusion criteria included; receiving spinal injury for reasons other than traffic accidents, paralysis being non-paraplegic, aged outside 23 to 36 years range. More than 5 years with spinal injury, previous attendance in stress coping technique classes (interviews revealed that none had previously attended these classes).

The study was conducted in pre-test, post-test form. Both groups completed Connor and Davidson resilience (27), depression, and DASS-21 stress and anxiety questionnaires. DASS-21 contains three sub-scales of self-report for assessment of negative emotions in depression, anxiety, and stress, each having 7 questions and final score of each sub-scale consists of total scores of these questions. Each question is scored from 0 (not applicable to me at all) to 3 (fully applicable to me). As short form of DASS was used (with 21 questions instead of 42) final score of each sub-scale must be multiplied by two (12). Samani and Jokar had investigated validity and reliability of the questionnaire for application in Iran previously and found re-test validity for depression, anxiety, and stress as 0.80, 0.76, and 0.77, respectively, and Cronbach's alpha of these as 0.81, 0.74, and 0.78, respectively (28). Assessment of reliability was done through confirmatory factor analysis and principle component analysis. KMO index was 0.9 and  $\chi^2$  was 3092.93 (in Croite-Bartlet test), which is significant at 0.001 level indicating adequacy of samples and

variables in factor analysis. One of the reasons for using this questionnaire in assessment of variables was measurement of depression, anxiety, and stress in patients with spinal injury by Lavybound, as well as its quick performance (29, 30). Mitchell et al. compared two diagnostic tools of BSI (Brief Symptom Inventory) and DASS-21 for better measurement of depression, anxiety, and stress in 49 spinal injury patients in Australia according to mini-international neuropsychiatric interview. Results indicated both tools' means lower than clinical threshold, but DASS-21 (being more sensitive) showed higher prevalence of depression and anxiety than BSI (31). Therefore, it was chosen for the purposes of this study. Through literature review of 1979-1999, the second research tool, Connor-Davidson resilient questionnaire was chosen (27). It has 25 items with Likert scoring system of 0 (totally wrong) to 4 (always right). Mean score for this test is 52. Higher scores than 52 indicate more resilience, and lower than 52 indicate less resilience (32). Validity of the questionnaire was assessed first by calculation of each question's correlation with total score, which was 41 to 64% for all except question 3. Cronbach's alpha showed reliability of 89% for this scale, and Samani et al. found reliability of 87% for this scale using Cronbach's alpha. For this analysis, KMO was 89% and Croite-Bartlet was 6.64. This factor shows 26.6% of total scale variance (28). Post-test was conducted after teaching trial group

methods of coping with stress over 8 sessions (90 minutes each) by researchers according to Donald Meichenbaum and Lazarus theory. How to complete the questionnaire was explained to all participants, and confidentiality of information was emphasized. All participants consented to taking part in the study. SPSS-16 software was used for analysis of the data, bar chart was used to compare the mean values of dependent variables of depression, anxiety, resilience, and stress, and covariance analysis was used to investigate theories of this study.  $P < 0.05$  level was considered significant.

### Results:

For both groups demographic variables like age, gender, and marital status were examined. Mean age of the 32 participants (equal numbers of males and females) was 29.53 years with standard deviation of 3.984, and mean age of trial and control groups were 30.6 and 28.38 years, respectively. In assessing the assumption of homogeneity of regression lines, there should be no interaction between pre-test variables and the group. According to the study results, values of p between the group and post-test variables; resilience, depression, stress, and anxiety were 0.85, 0.135, 0.189, and 0.226, respectively, indicating parallel regression lines. Mean pre-test, post-test scores of resilience, depression, stress, and anxiety in both groups are presented in charts 1 to 4.

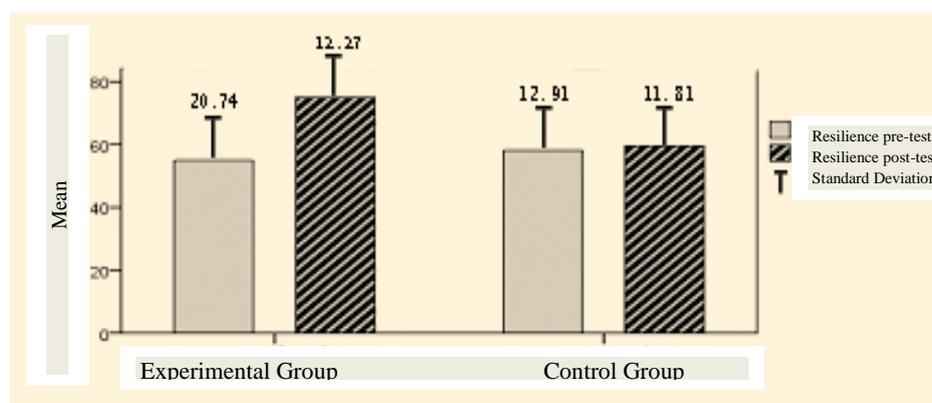


Chart 1- Comparison of mean scores of pre-test, post-test resilience in two groups

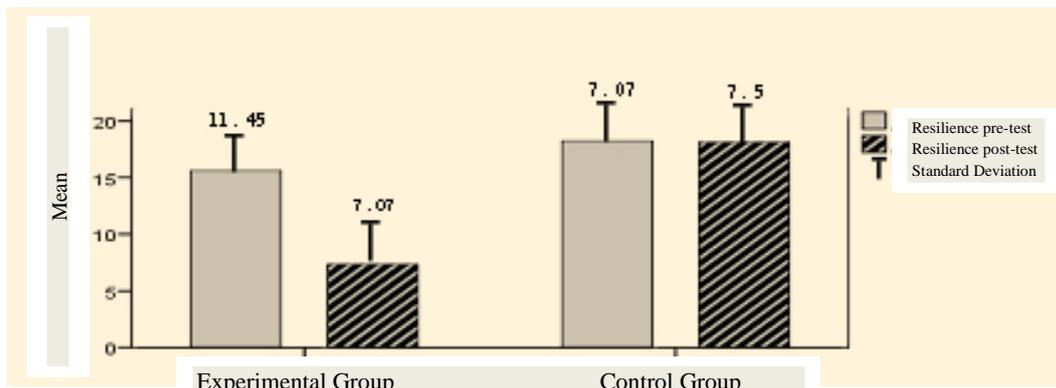


Chart 2- Comparison of mean scores of pre-test, post-test depression in two groups

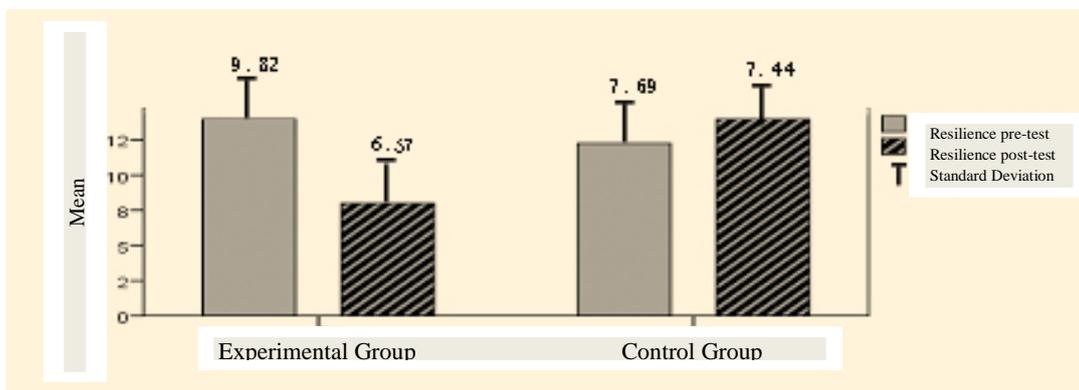


Chart 3- Comparison of mean scores of pre-test, post-test anxiety in two groups

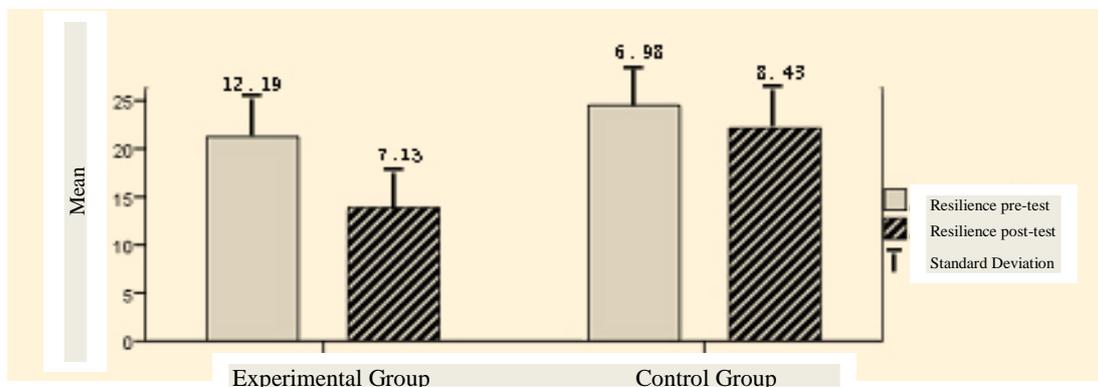


Chart 4- Comparison of mean scores of pre-test, post-test stress in two groups

It can be seen from these charts that the trial group scores for depression, stress, and anxiety have reduced after training compared to those in the control group, but resilience score has significantly increased. Results of covariance analysis of data are shown in table 1.

Table 1 shows, with significant level ( $P \leq 0.05$ ), degree of freedom 1,  $F=0.53$ ,  $F=1.175$ ,  $F=5.586$ , and  $F=2.183$ , training methods of coping with stress did not show any significant difference in the level of anxiety ( $P \leq 0.05$ ), but this training caused a significant reduction in depression, stress ( $p \leq 0.05$ ), and a significant increase in resilience ( $P \leq 0.05$ ).

Table 1- Covariance analysis test for assessment of the effect of training method in coping with anxiety, depression, stress, and resilience in patients with spinal cord injury

Variable source	Sum of Squares	Degree of freedom	Mean squares	F	P
Dependent variable: Anxiety					
Group	19.045	1	19.045	0.530	0.473
Error	1005.799	28	35.921		
Total	7872	32			
Dependent variable: Depression					
Group	35.351	1	35.351	1.175	0.046
Error	1381.182	28	49.328		
Total	11956	32			
Dependent variable: Stress					
Group	239.699	1	239.699	5.856	0.022
Error	1146.174	28	40.935		
Total	19792	32			
Dependent variable: Resilience					
Group	34.042	1	34.042	2.183	0.048
Error	5220.084	28	186.432		
Total	111188	32			

### Discussion:

Results showed that group training methods of coping with stress, without the need to use other approaches such as psychotherapy, family therapy, and counseling has a significant effect on resilience, depression, and stress in paraplegic patients, with a reduction in depression and stress, and an increase in resilience. However, training did not have a significant effect on anxiety (chart 3). Many studies have investigated the relationship between coping methods and stress and anxiety, and many found that coping based on excitement was directly related to anxiety (35). Therefore, it is possible that some members of the trial group may have used coping method based on excitement to reduce anxiety, and thus, could not control anxiety down to a desirable level. Also, training methods of coping with stress may have reduced patients' apparent anxiety more than it did the intrinsic or latent anxiety, and probably, with longer training period latent anxiety would have reduced, as well. In addition, relaxation of lower back muscles was eliminated from the training as patients found it hard to perform these exercises that could have even caused anxiety. Therefore, training did not succeed to significantly reduce anxiety. Nowroozi, examined the effect of

relaxation on anxiety in hospitalized spinal cord injury patients and found that relaxation of lower back muscles significantly reduced anxiety (36). Moghadam and Kohan also found art-therapy effective in reducing stress and anxiety in spinal injury patients (37). Kocca studied the incidence of denial and anxiety in these patients and found that patients with paraplegia used more denial and patients with quadriplegia showed more anxiety in their coping strategies (35). These results did not agree with results obtained in this study, and from covariance analysis results (table 1), it can be seen that training increased resilience in patients. A study by Brian Whitey et al. whose results concurred with those of this study showed that resilience determines tolerance and resistance levels in patients facing depression and anxiety as a positive psychiatric strategy (38). Stephbergen and Perini studied 630 patients with post-polio syndrome in relation to psychological aspects of resilience such as acceptance, interpersonal relationships, self-efficacy, stress and health management, and depression symptoms. They concluded 53% scored high in their health resilience factor, and that four resilience factors are the main predictors with 30% variance in depression symptoms and mental growth (39). Catalano et al. studied the effect of

resilience on reducing depression symptoms in 255 paraplegic patients and reported that resilience as stress protection could reduce depression symptoms in these patients. They also found resilience as a clinical intervention effective in increasing patients' mental health (40). Johnson et al. investigated resilience in 80 spinal injury patients in relation to coping with stress and psychological adjustment and found resilience effective in reducing psychological distress symptoms such as PTSD, anxiety, and depression (41). Changes in resilience, depression, and life satisfaction during rehabilitation period in 42 patients with spinal injury were investigated by White et al. They revealed no significant change in resilience, but the change in adjustment signs was significant. Also, there was a significant correlation between resilience, depression and life satisfaction (42). As can be seen from table 1, coping with stress training methods reduced depression in spinal injury patients. In line with results of this study, was the study by Orhestler et al., in which level of depression in patients who had received spinal cord injury from 1967 to 1995. The results indicated the importance of these trainings in reducing depression (43). In 2000, Kennedy et al. stated that 67% of depression in spinal injury patients is predicted by stress coping styles (44). Savati et al. investigated efficacy of cognitive-behavioral therapy in improving psychological consequences of spinal injury such as depression, anxiety, coping with stress, and adjusting to disability. They concluded that cognitive-behavioral therapy could be effective in reducing psychological symptoms (45). Hoffman et al. conducted a longitudinal study of depression in 1035 patients with spinal cord injury and found 21% of patients with one-year and 18% with 5-year experience suffered major depressive disorder. Psychological intervention was necessary for identifying risk factors in this group (46). Ebrahimi et al. found stress coping styles and social support reduced

depression in spinal injury patients and created better feeling and tolerance of consequences of disability (47). Dorstien et al. investigated depression among 11 spinal injury patients undergoing cognitive-behavioral therapy before and after training and measured stress, anxiety, and depression using DASS-21 and compared results obtained with those in 13 people in control group. Results indicated significant control of emotions in trial group compared with control group, and trial group had improved in terms of emotion consequences (48). In a study by Dachink et al., both stress coping and support group methods were found effective in reducing anxiety and depression, but stress coping method was more effective (49). As can be seen in table 1 and chart 4, training stress coping methods significantly reduces stress in patients with spinal cord injury. Of studies that concur with this study is Anthony et al. study, in which, stress and stress coping strategy is investigated in 50 patients with spinal injury. They concluded that although different stressful situations and ways of dealing with them affect quality of life, no matter how they are dealt with, stressful situations are not directly related to life satisfaction (50). Rachel et al. examined PTSD and depression in patients with spinal injury and found they were not related both in people with and without spinal injury (51). Clyer et al. examined the effects of routine stressors and mood among patients with and without spinal injury, with results indicating significant effects of stress on positive and negative mood, and association of stress with cortisol and mood is much the same in both groups (52). A study by James Cruise et al. on PTSD patients with spinal injury revealed more PTSD in these patients compared to those without physical injuries, and that it is often accompanied by depression (53).

It should be noted that results of this study relates to paraplegic patients aged 23 to 36 years who were injured in traffic accidents.

Therefore, care must be taken in generalizing these results to other age groups and patients with congenital spinal cord injury or those with tetraplegia.

**Conclusion:** Training stress coping methods reduces stress and depression and increases resilience in patients with spinal cord injury. This is due to learning how to deal with unavoidable difficulties and hardship in life and better coping with stress and unpleasant events in a practical way. Given that group training over 8 sessions did not succeed to alleviate anxiety significantly in 23- to 36-year-old patients, it is recommended that intervention be performed over a longer

period, and then its effect on anxiety be investigated. To reduce anxiety in patients, more diverse and dissimilar materials such as cognitive-behavioral therapy should be used in training package in order that treatment goals can be achieved. This training should also be carried out on patients with tetraplegia of spinal cord and its effect investigated.

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