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# ROLE OF PSYCHOLOGICAL PROBLEMS IN EFFICACY OF TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION IN PATIENTS SUFFERING FROM CHRONIC PAIN

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**Abstract-** Patients afflicted with chronic pain have both physical and psychological problems. This research investigated the impact of the psychological factors in the treatment results of transcutaneous electrical nerve stimulation (TENS) in the patients afflicted with chronic diseases. The subjects were 37 individuals (20 males and 17 females) with the mean age of 46 who had referred to two centers of physiotherapy treatment to receive TENS treatment process. Subjects were suffering from chronic pain in upper part of their body, hands and legs. The subjects were tested and screened psychologically by PDQ4+, MPQ, MPI, and BDI questionnaires. On the basis of the personality disorder and the intensity of the depression, they were divided into two groups: 1) patients with psychological symptoms (n = 14); and 2) patients without psychological symptoms (n = 23). In order to study the rate of the pain intensity reduction in both groups, the MPQ questionnaire was used in three stages (before beginning, in the middle and at the end of the treatment). Also, the MPI questionnaire was used in order to review the inter-personal problems, the interference of the pain in life, daily performance and the rate of social support. Results showed that in each group, the pain intensity had significantly reduced as a result of the impact of TENS treatment and the psychological factors did not have meaningful impacts. Also there was statistically significant correlation between the rate of social support of the family members and the reduction of pain intensity.

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**Key words:** Chronic pain, psychological symptoms, transcutaneous electrical nerve stimulation, psychological test

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## INTRODUCTION

The patients afflicted with chronic pain usually experience depression, sleep problems, fatigue,

a reduction in physical and psychological function, and distress in their personal relations particularly with their family.

Previous studies have shown that psychological distresses are prevalent in a population afflicted with chronic pain (1-3). Daniel *et al.* have concluded that many of the patients afflicted with chronic pain suffer from personality disorders, drugs abuse, instability in family relations and professional and

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legal disconformities (4). It has been also reported that a large portion of the population afflicted with chronic pain suffers from depression (5), maladjustment, social stresses, and family environment stresses (6). Although in several studies a relation was seen between psychological distress and chronic pain but the nature of this relation and the causes of it are still unclear.

Considering the mentioned relation and the influence of psychological health on the results of medical treatments, the evaluation of the psychological variables is important in the treatment of chronic pain, especially for the patients who seek medical treatment (4). The success of the medical treatment of patients with chronic pain is dependent to the accompanied psychological treatments.

In this study, we intended to evaluate the impact of the psychological symptoms on the results of the treatment process of transcutaneous electrical nerve stimulation (TENS) in patients afflicted with chronic pain.

## MATERIALS AND METHODS

### Subjects

Thirty seven patients (17 females and 20 males) aged between 23 to 71 years which were diagnosed with chronic pain and referred to the research and training centers of physiotherapy units of Kasra and Baqiyatallah Hospitals for TENS and other allied treatments were included in this study. All these patients were diagnosed with Chronic pain in the areas of legs, back, hands, neck or shoulders and had undergone different medical treatment frequently. Gender, age, and marital status of the subjects are presented in table 1. We obtained informed consent from all patients.

### Questionnaires

1. *Multi-dimensional pain inventory (MPI)*: is one of the instruments being used to identify the biological, psychological and social factors of pain (or multi dimensions of chronic pain) (7). This questionnaire provides a precise report of perceptions and statements and also measures the rate of chronic pain. This questionnaire is frequently

used for outpatients in centers of pain management (7).

MPI has been divided into three main experimental pivots. The first pivot is termed as dysfunctional and the individuals who are placed in this pivot report a high level of pain intensity. The second one is the interpersonally distressed one in which afflicted individuals receive some social support from their parents or another important individual in their life. The final pivot is the adaptive copper pivot. Individuals classified in the third pivot usually suffer from a low level of pain intensity (7). MPI can identify pain intensity, feelings of incapability, emotional distress and ability to cope with pain. It can also be used to study the course of changes during the treatment of pain and to evaluate the treatment results. The specific characteristic of this test is that it evaluates the perception of the patients on the support received from significant individuals in the life of the patients (the perceptual response of the partner of the patient) (7).

This test has 54 items, and 12 scales and it takes approximately 20 minutes to be performed and the value of each question is graded between zero and 7. The MPI test was used in order to evaluate the interpersonal relations, the support by significant individuals in life, and the interference of pain in daily life. In this research, MPI was used in a clinical interview and only four items of INF, AFFECT, PUN and SUP concerning interference of pain in daily life, lack of family support, negative emotion and punishment responses by others was used.

2. *Beck Depression Inventory (BDI)*: It is utilized to examine the rate of depression in the patients. and measures the different grades of depression. BDI has 21 items and the total score of the subjects' depression is made up by the total scores of the all items. Points zero to 9 shows the normative state, points 10 to 15 indicates slight depression, points 16 to 23 shows mean depression and points 24 and higher indicate the intensive depression (8).

Beck has confirmed the reliability and validity of this inventory (9). In a later study, Pourshahbaz (8) has reviewed the reliability of the BDI in 116 Iranian people and has shown that the validity co-efficiency of the points of each part was a total mark between

0.23 to 0.68, the internal consistency of the scale was 0.85 and the validity of two halves of scale using the Spearman Brown formula was 0.81 (8).

3. *McGill Pain Questionnaire*: This questionnaire is used to measure the pain intensity and patient's control of the pain reduction process during the treatment period. This questionnaire has been developed in 1971 by Melzack and Torgerson to test multidimensional pain (10, 11). The tool describes 75 words such as: burning, compressed, to make a hole.... The patient is asked to put a checkmark on the best description which these words have on his/her pain and words have been classified in 20 items group. Each row describes the pain intensity (With 2 to 6 words in each group, the power and intensity of the pain increases from top to down). The patients are trained to put a circle round each word ranging from zero up to a maximum of 75 for the pain intensity which describes their pain in the best way. This questionnaire has three components on the bases of the portal theory of the ache of Melzack and includes feeling, emotion, motivation and recognition evaluation of the pain. The questionnaire was used in form of clinical interview during the treatment with TENS at the beginning and at the end of the treatment period.

4. *Personality Disorder Questionnaire 4+ (PDQ4+)*: the PDQ4+ is a self-report questionnaire which has been developed by Hiller in 1987 (12) and includes 99 questions covering 14 scales. The questions has been designed with true and false responses and adopted on the bases of clinical symptoms and indications of personality disorders in access of DSM. Many researches have already been performed on the reliability and validity of these questionnaires. Moreover, these questionnaires have been used in different researches relevant to personality disorder. This questionnaire has 12 clinical scales and two validity scales and was standardized on university students (n=1008) in 2001 (10).

## Procedure

The patients were divided into two groups: 1) those with psychological symptoms and 2) those without psychological symptoms on the bases of the following indices: a) depression marks in BDI test of

17 and higher, and b) recognition of personality disorder on the basis of PDQ4+ test.

In order to reduce the pain, the treatment method of TENS was used for both groups.

## TENS treatment method

TENS is one of the recognized treatment methods to reduce the pain whose impact in particular on the treatment of chronic pains has been confirmed (13, 14). In this treatment method, TENS is applied on the closest place of pain and the electrodes are placed in parallel to the body of the main nerve. Insensibility is created with frequency of 500 and 100 which can not be removed by Naloxone (14). Stimulating the bigger fibers with myelin membrane disconnects the pain in the path of spinothalamic.

We studied reduction of the pain intensity before and after the process of treatment in both groups (before and after the TENS treatment intervention) and evaluated relation of depression and the reduction of pain intensity (at the time of the first session of the beginning of treatment and then at the end of the TENS treatment session).

We also evaluated relation of reduction of pain intensity with presence of interference in ordinary daily living, support and dependence on partner or an important individual in life, personality disorders, punishing reactions from others and emotional distress (affective distress), using MPI test.

SPSS 12 for window was used to perform statistical analysis. ANOVA was used to compare the means to determine the rate of pain reduction during one week after the end of treatment.

## RESULTS

Table 1 shows the characteristics of both groups of the subjects. Table 2 shows the depression intensity and the epidemiology of personality disorder among the patients. The borderline personality disorder, depression, paranoia, negativism, hysteria and obsessive compulsive disorder (OCD) were observed among the patients afflicted with chronic pain along with psychological symptoms.

**Table 1.** Characteristics of both groups of the subjects

| With psychological symptoms (n = 14) |       |        |      |                |         | Without psychological symptoms (n = 23) |       |        |      |                |         |
|--------------------------------------|-------|--------|------|----------------|---------|---|-------|--------|------|----------------|---------|
| Age                                  |       | Gender |      | Marital status |         | Age                                     |       | Gender |      | Marital status |         |
| Mean                                 | SD    | Female | Male | Single         | Married | Mean                                    | SD    | Female | Male | Single         | Married |
| 43                                   | 10.31 | 6      | 8    | 3              | 11      | 48                                      | 12.22 | 11     | 12   | 7              | 16      |

Results of measuring pain intensity in each group at three stages (before the beginning of the treatment, at the middle of treatment and at the end of treatment), using MPQ test, are shown in table 3. The pain intensity reduced significantly in the third stage compared to the two previous stages. In order to study the reduction of the pain intensity in each group of the patients, the variance analysis of mixed plans was used (in the event that the data are of two different groups and these groups are measured frequently in different stages, the intra-group and inter-group plan of analysis and the variance of mixed plans can be used). The results indicated that there had been statistically significant reduction of the pain in both groups. The pain in the patients without psychological symptoms reduced to a greater extent compared to group of the patients with psychological symptoms, but the difference was not statistically significant.

**Patients with psychological symptoms**

The rate of pain after using TENS in the patients with psychological symptoms decreased significantly (from the mean of 35.79 to the mean of 24.8). Also the correlation (0.60) resulting from the

**Table 2.** Depression intensity and the epidemiology of personality disorders among the subjects\*

| Subjects                    | With PS | Without PS |
|-----------------------------|---------|------------|
| <b>Personality PDQ4+</b>    |         |            |
| OCD                         | 3       | 1          |
| Hysteria                    | 2       | 1          |
| Negativism                  | 3       | 1          |
| Paranoid                    | 3       | 1          |
| Depressed                   | 4       | 1          |
| Borderline                  | 4       | 2          |
| <b>Depression intensity</b> |         |            |
| SD                          | 3.88    | 3.99       |
| Mean                        | 25      | 12         |

Abbreviations: PS, psychological symptoms; OCD, obsessive compulsive disorder.

\*Data in personality evaluation are given as mean score.

relation between the treatment process of TENS and the reduction of the pain intensity in the group with psychological symptoms at the level of 0.99 were statistically significant.

**Patients without psychological symptoms**

The rate of pain after using TENS in the patients without psychological symptoms reduced significantly from the mean of 34.13 to the mean of 18.96. Also, the correlation (0.61) being obtained as a result of the relation between the treatment process of TENS and the reduction of the pain intensity in the group with no psychological symptoms at the level of 0.98 was statistically significant.

In total, the rate of pain after using TENS has reduced statistically significant in the patients afflicted with chronic pain with or without psychological symptoms as a result of treatment process of TENS. Also the correlation (0.72) between the treatment process of TENS and the reduction of pain intensity in both groups with psychological and without psychological symptoms at the level of 0.99 was statistically significant.

In the first stage of implementing MPQ, there was no statistically significant difference in pain intensity in patients with and without depression ( $P = 0.81$ ), personality disorders ( $P = 0.87$ ), rate of family support ( $P = 0.097$ ), punishing reactions by others ( $P = 0.46$ ), emotional and affective distress ( $P = 0.69$ ) and interference in daily living ( $P = 0.18$ ).

Also, in the final stage of implementing MPQ, there was no statistically significant difference in pain intensity in patients with and without in patients with and without depression ( $P = 0.91$ ), personality disorders ( $P = 0.90$ ), punishing reactions by others ( $P = 0.43$ ), emotional and affective distress ( $P = 0.43$ ) and interference in daily living ( $P = 0.18$ ). But, there was statistically significant difference in pain intensity in patients with and without family support ( $P = 0.004$ ).

**Table 3.** Mean and standard deviation of pain intensity feeling in both two groups

| First stage MPQ |      |            |      | Second stage MPQ |      |            |       | Third Stage MPQ |      |            |      |
|-----------------|------|------------|------|------------------|------|------------|-------|-----------------|------|------------|------|
| With PS         |      | Without PS |      | With PS          |      | Without PS |       | With PS         |      | Without PS |      |
| Mean            | SD   | Mean       | SD   | Mean             | SD   | Mean       | SD    | Mean            | SD   | Mean       | SD   |
| 35.79           | 8.30 | 34.13      | 8.61 | 30.1             | 6.60 | 28.13      | 11.67 | 24.8            | 7.88 | 18.96      | 5.56 |

Abbreviation: PS, psychological symptoms.

## DISCUSSION

Chronic pain is a common clinical complaint, and patient dropout can be a major complication to treatment. The authors examined the role of psychological problems in efficacy of TENS in patients suffering from chronic pain. The results of the present research showed that TENS was effective in both groups of patients with or without psychological symptoms and the difference of reduction in pain intensity in two groups was not statistically significant. This result confirmed that the TENS is a treatment method to reduce the pain whose impact in particular on the treatment of chronic pains has been confirmed. This was confirmed by previous researches (13, 14). Furthermore, the psychological problems have not prevented the effect of this method. In every situation, TENS has been effective to reduce pain in two groups.

The authors also examined the role of family support on the treatment of chronic pain. As the results shown, using this method has reduced the pain intensity in the group who had family support more than the group without family support. Findings underscore the importance of family support. Attempts should be made to correct misconceptions and the role of family support. This also was confirmed by previous researches (15-17).

In conclusion, the results of this research can be summarized as TENS method along with family support will have considerable impact on reducing the pain intensity and the psychological problems will not impede this effect.

### Conflict of Interests

We have no conflict of interests.

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