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Chronic Musculoskeletal Pain Adaptation in Relationship with Inhabitation Behavioral System, Activation Behavioral System and Perceived Social Support

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ABSTRACT

Aim: The aim of this study was to predict the chronic musculoskeletal pain adaptation to according inhabitation behavioral systems, activation behavioral systems and perceived social support.

Method and Materials: In this descriptive correlational study, 270 patients with chronic musculoskeletal pain assessed with Illness Social-Psychosocial Adjustment Scale, Multidimensional Perceived Social Support Scale, and Wilson & Gary Brain Behavioral Systems Questionnaire. Data were analyzed by SPSS 20 statistical software using regression statistical method.

Findings: Findings revealed the behavioral inhibition system predicts pain adaptation scores positively and the behavioral activation system predicts pain adaptation scores negatively. Perception of social support in three dimensions of family, friends, and important individuals could negatively predict 42% of the variance of pain adaptation.

Conclusion: This study showed there is a relationship between behavioral brain systems and perceived social support with pain adaptation. Therefore, it can be concluded that perceived social support and behavioral brain systems predict pain adaptation.

Keywords: Pain Adaptation, Perceived Social Support, Behavioral Activation System, Behavioral Inhibition System

Introduction

Pain defined as an unpleasant experience of emotion and sensation associated with real or unreal emotional or physical injury [1]. Musculoskeletal disorders are among the most common chronic pains. These disorder manifests as painful symptoms in various areas of the body such as the knee, hip, elbow, wrist, shoulder, neck, as well as organic lesions in those areas and organs [2]. The prevalence of chronic pain in the general population estimated about 30-50%, which is higher in females [3]. The prevalence of chronic pain among outpatients is more than 80% and this pain leads to a significant increase treatment cost and duration [4]. Disabling nature of musculoskeletal disorders impair the quality of life of patients during long time. These disorders cause 30% of total and 40% of partial disability in different countries [5]. When people experience chronic pain, they cope with it in different ways. Some people have serious problems in coping with this disorder. It seems that personality factors, especially biological aspect, can be involved in adaptation process [6].

Adaptation defined as the response to a change in stimulus that allows the organism to adapt appropriately to that change. This definition indicates that adaptation occurs over time. Adaptation to illness defined as the process of maintaining a positive view of oneself and the world in face to the health problems and incompatibility with anxiety, depression, helplessness, and behavioral problems [7]. Poor

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illness adaptation is associated with lower chances of recovery and higher unnecessary treatment costs [8]. Patients tries to adapt with internal and external pressures, and this effort occurs in order to respond to the needs and desires based on their personality [9]. According to the recent theories of pain, the role of biological and psychological factors is more prominent in these cases. There are various perspectives to explain the relationship between personality traits with physical and psychological disease [10]. In the theory coined by Gray three brain-behavioral systems defined based on individual sensitivity differences to different stimuli. This theory relies underlie personality differences: the Behavioral Activation System (BAS), the Behavioral Inhibition System (BIS), and the FFS system. The dominance of each of these systems in the individual leads to different emotional states, coping style, and different reactions [11]. Negative emotions is associated with activating the inhibition system and in contrast, the behavioral activation system is provoked with positive emotions [10]. Pain as an unpleasant stimulus may activate the behavioral inhibition system. By activating this system, anxiety, depression, stress and negative emotions become more pronounced. The presence of these negative emotions along with focusing on fears and punitive stimuli can affect adaptation to pain [12].

Sánchez-Rodríguez et al. [13], showed BIS/BAS play a role in pain management. On the other hand, the potential therapeutic role of social support in patients with chronic pain has long been interested the researchers. In recent pain studies, the role of social factors has become more highlighted [14]. Increased perceived social support is associated with increased mental function, physical health, and higher adjustment [15]. The results of the study conducted by Finlay et al. [16] showed that perceived social support could affect the ability chronic pain adaptation.

In general, in this field limited researches conducted in Iran. Studies on the biological, psychological, and social approaches to the development and course of chronic pain have not received enough attention. While chronic pain may have serious consequences for human capital, identifying the pathology of chronic pain requires a multidimensional and deeper look; therefore, this study aimed to investigate the role of behavioral brain systems and perceived social support in predicting chronic musculoskeletal pain adaptation.

Method and Materials

This was a descriptive – correlational study. The statistical population included all patients with chronic musculoskeletal pain syndrome who referred to physiotherapy clinics in Mashhad city during Jan-Apr2020. According to the James Stevens (2002), for each predictor variable 15-20 cases samples considered [17]. The sample size considered 300 case taking into account of the 10% possible drop. The researcher selected 18 clinics through available methods and referred to them. Of these, 11 clinics agreed to cooperate. Among the patients with chronic musculoskeletal pain in physiotherapy clinics of Mashhad city, 300 people were met the study criteria's. Inclusion criteria were a minimum of three months of musculoskeletal pain (neck and shoulders, chest and abdomen, back and limbs) experiences, persistent chronic pain during the last week, minimum diploma education, age range 30 to 60 years. Exclusion criteria were chronic pain due to the tumor, severe vertebral fracture, infection, cancer, use of psychotropic medications, co-occurrence of other physical and mental disorders that interfere with the research process. Finally, after removing the distorted and invalid

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questionnaires, 270 cases remained for the final analysis. Research data collected through the following tools: Psychosocial Adjustment Scale (PAIS): This questionnaire developed in 1990 by Leonardo and Drogatis. The questionnaire consisted 46 questions in four opinions (0-3) in seven subscales health care orientation (8 questions), work environment (6 questions), home environment (8 questions), sexual relations (6 questions), family relationships (5 questions), social environment (6 questions), and psychological helplessness (7 questions). Higher scores indicate less compatibility. In the pilot study, reliability with Cronbach's alpha were 0.47-0.85 [19].

The construct validity of this scale using exploratory factor analysis by Varimax rotation method showed reliability of seven factors. In Iran, Feghi et al (2013) confirmed the content validity of the questionnaire [20]. The reliability coefficient in this study obtained with Cronbach's alpha for the total score and components between 0.84-0.91. Multidimensional Perceived Social Support Scale (MSPSS) designed by Zimet et al. (1988). Consisted 12 items in three components: Perceived support from family (4 items), Perceived support from important people (4 items) and perceived support from friends (4 items). The items graded in a Likert scale (strongly agree, agree, some disagree, disagree, and strongly disagree). The range of scores on this scale is 12 to 60. In the study conducted by Edwards Cronbach's alpha was 0.86 and for the subscales of family, friends and special person 0.61, 0.90, 0.88, respectively. The construct validity of the questionnaire confirmed by exploratory factor analysis [21]. In Iran, the content validity of this scale confirmed by the experts. Cronbach's alpha used to determine the reliability of the questionnaire, which is 0.74 for family support and 0.76 for important people [22]. The reliability coefficient in this study obtained with Cronbach's alpha between 0.89-0.88.

Behavioral Brain Systems Questionnaire (BBSQ) designed by Wilson, Bart and Gray (2003) included 28 questions. The questionnaire included two subscales of behavioral inhibition and behavioral activation with three options of Yes (2) -No (0) and I do not know [1]. In a pilot study Slobodskaya, Knyazev, Safronova & Wilson (2003) reported 0.72 and 0.74 for Cronbach's alpha of BAS and BIS. The validity of the 28-item form was assessed using factor analysis and two factors of behavioral activation and behavioral inhibition obtained [23]. Sepah Mansour (2005), reported Cronbach's alpha equal to 0.67 for BAS and 0.62 for BIS. In addition, the validity of the questionnaire was assessed using the Goodman Capabilities and Problems Questionnaire and a significant correlation was obtained between the two questionnaires [24]. The reliability coefficient in this study obtained with Cronbach's alpha between 0.91-0.88. The collected data analyzed in SPSS-20 statistical software. Mean and standard deviation used to describe the data. Inferential statistical methods were Pearson correlation coefficient and regression in significance level of 0.05.

Findings

Out of 300 about 270 questionnaires were valid. As shown in Table 1, 111 (41.10%) of the participants were male and 159 (58.90%) of the participants were female. The age range of the subjects was between 38 and 60 years old. Before analyzing the research data, the underlying assumptions of the analysis examined. The assumptions of normality, uniformity of multivariate regression dispersion, and lack of multiple alignment estimated. The following regression model used to predict pain adjustment through the dimensions of behavioral brain systems

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Table 1) Results of pain adjustment regression analysis based on BIS/BAS

Prediction	R	R2	F	B	EE	t	Beta
BAS	0.62	0.39	172.27	-3.83	0.29	-13.12-*	-0.62
BAS/BIS	0.68	0.46	116.38	-3.12 0.65	0.29 0.27	-10.45* 6.10	-0.50 0.29

Table 2) Results of pain adjustment regression analysis through perceived social support

Prediction	R	R2	F	B	EE	t	Beta
Perceived social support	0.64	0.42	194.81	0.12	-1.67	13.95-	-0.69

(BIS/BAS).

εi+ BIS/BAS β1+ β1 = (Pain Adaptation)

Durbin Watson was 1.81, which indicates that there is no violation of the assumption of residual independence. In addition, the values of tolerance index and VIF statistics were 1, 1, 0.84 and 1.18, respectively, which indicates that there is no multiple alignment**.** The first model shows that 46% of the observed variance in pain adjustment is justified by the BIS/BAS(R = 0.46), given the value of F and the significance level (P) is less than 0.01 with 99% confidence there is a linear relationship between the BAS/BIS and adaptation to pain. According Beta value if the BIS increases by one unit, this change 0.29 increases in the pain adaptation scores. This was 0.50 for BAS. The following regression model was used to predict pain adjustment through social support.

εi + (social support) βO = (pain adjustment)

The statistic value of Durbin Watson was 1.59, and VIF were 1 and 1, respectively. The first model shows that 42% of the observed variance pain adaptation is justified by social support (R Square = 0.42). The value of F and t was significance at level (P) which is less than 0.01, the null hypothesis is rejected. According Beta if the social support increases by one unit, pain adaptation scores decrease by 0.64 units.

Discussion

The results showed that behavioral brain systems are involved in the pain adaptation. BIS significantly and directly predicted pain adaptation. This implies the higher activation of inhibitory behavioral mechanisms, pain adjustment scores increased. In contrast, the behavioral activator dimension had a significant negative role in the pain adaptation. People who frequently used the BAS reported lower scores in adapting to pain. Lower scores on the adaptation questionnaire indicate better adaptation to the disease; thus, it means that the BAS increases ability of adaptation with pain. This finding is consistent with the results obtained in the previous studies [25-26]. The findings of Serrano-Ibáñez et al. (2018) explain this finding [27]. The authors conclude that there is a close relationship between BAS and behavioral inhibition with emotion regulation, therefore these systems potentially are effective in coping and adaptation with stress and illness. In addition, according to the theory of sensitivity, reinforcement of the BIS or BAS in a person leads to different emotional states such as anxiety, motivation, and fear,

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also stimulates different dreaming and behavioral reactions. The recent research has showed the moderating role of everyday events such as distress in illness and mental health. The results indicate high emotional sensitivity is strongly related with the inhibition systems.

The sensitivity of the BIS can explain the emotional response to pain stimuli and adjustment issues. In this way, the person who uses behavioral avoidance are most likely avoid their responsibilities in the work environment. They could not afford their role properly at home because of pain avoidance, so they avoid from works to experience less pain. The same issue in the social environment causes them to be limited in social appropriate and reduce their socialization. Gradually, with increasing inhibitory behaviors and fear of role-playing, it intensifies the person's sense of psychological helplessness, reduces the health-supported factors, and significantly affects adjustment.

The results also showed that perceived social support is involved in predicting adaptation to pain and can predict this variable significantly and inversely. This means that by increasing the participants 'perceptions of social support from friends, family, and important individual's pain adjustment scores decreased. Since lowering pain adjustment scores means increasing adjustment, in fact, increasing perceived social support has played a positive role in patients' adjustment to their pain. This finding is consistent with the results obtained in the previous studies [28-29].

The results of existed studies explain these finding. As perceived social support can increase self-efficacy, change the evaluation of health status from threat to challenge, and strengthen coping approaches. When the patient feels helpless due to pain and on the other hand, his perception of the social support of others is low, his self-efficacy decreases, the patient experiences more problems in family, social, and work relationships. These problems can lead to increased irritability to pain and ultimately reduced adaptation to pain. Finally, the findings of the present study showed that behavioral brain systems play a role in adapting to pain. With increasing use of inhibitory behavioral mechanisms, pain adjustment decreased. In contrast, individuals who frequently used the BAS reported higher adapting to pain. This finding explained by the avoidance fear model.

This study faced some limitations, including the fact that the present study was limited to the population of people with musculoskeletal pain and it is not clear that the research variables have a similar share in predicting other populations. This research has been done on a limited number of people; therefore, generalization of its results in other studies should be done with caution. The factors affecting pain adjustment have not been studied in the form of qualitative studies and there is little information in this field that made it difficult for the researcher to access qualitative information.

Conclusion

This study showed people who are highly sensitive to anxiety and strongly avoid punishments show more fear and avoidance, and this increases their incompatibility with pain. In contrast, people with higher behavioral activation show higher self-efficacy because they do not have a disproportionate fear of pain and do not avoid movement due to fear of pain. Eventually, they show better adaptation to daily affairs. The significant relationship between perceived social support and adaptation to pain in fact indicated the important point that adaptation to pain as

a complex variable influenced by mental cognitions as well as social and personality factors. This finding is consistent with socio-psychological biological theory. According to this theory, the combination of the factors determines the degree of adaptation to pain in the patients, and to understand the condition of patients, different dimensions must be considered at the same time.

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Author Contribution: AAS was corresponding author of the study (%30). ST was methodologist and translator of the study (%50).QS analyzed the data (20%).

Conflict of Interest: The authors declare that there is no conflict of interest with the individuals or organizations involved in the research.

Ethical Permission: In this study, all ethical principles were respected. The aim and procedures of the study was explained for the participants. The consent form was signed by all participants.

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