

Assessment of stress in chronic low back pain patients

Firoz Ahmed Mamin¹, Muhammad Shahidul Islam²

Abstract

Purpose of the study: Chronic low back pain is a global health problem and most common form is non specific chronic low back pain which has no definitive structural diagnosis. This problem is not purely physiological, physiological factors also involved. Most of the chronic low back pain patients suffer in stress. The aim of this study was to observe the stress in chronic LBP patients. **Methodology:** This study was an experimental study between two groups. 20 participants voluntarily participated in this study. **Results:** The results found that chronic low back pain patients had more pain catastrophizing and had tendency CLBP patients also had a higher tendency of cortisol and DHEA.

Key words: Cortisol, DHEA, Stress

¹Assistant professor, Department of Physiotherapy, Bangladesh Health Professions Institute, Centre for the Rehabilitation of the Paralyzed (CRP), Savar, Dhaka, Bangladesh, ²Senior Physiotherapist & OPD PT Incharge, Department of Physiotherapy, CRP, Savar, Dhaka, Bangladesh.

Correspondence:maminens@gmail.com, Cell: +88 01757702561

Introduction

Chronic low back pain is a major health problem worldwide and responsible for significant health and socioeconomic cost (Wand & O'Connell, 2008 & Macedo, 2008). About 75% to 85% of people will experience some form of low back pain during their lifetime (Waller, et al., 2009). Back pain can affected people of all sectors of society. The incidence of back pain is not restricted by sex or age and affected nearly every age from the young adolescent to the older adult (Burton, 2005 and Kennedy, et al., 2008).

The estimated annual cost for low back pain associated disability and work absence is more than \$50 billion in the USA and \$11 billion in the UK (Lewis et al., 2008). In the UK about 3 to 7 million people in a year consult with physician for back pain. Fifty two million working days are lost each year (Somerville et al., 2008).

Back pain is the main cause of absence from work and disability in industrial societies (Maher et al., 2005). Work absenteeism due to back pain is a cause of great economic loss (Jellema, et al., 2007). Low Back Pain is the second most common cause of adult disability in Europe and third cause in the USA over 45 years of age. Chronic low back patients account for 80-90% of money is spent for treatment of low back pain (Moldovan, 2009). Chronic low back pain patients also suffer from psychological distress. Persistent pain is a source of stress in chronic low back pain. Stress and pain are interrelated (Apkarian et al., 2004). Treatment of chronic low back is mainly concentrate on pain relief. Psychological problems frequently ignored (Pincus & Newman, 2001). However, no single treatment procedure found more effective than others did. Exercise has been using as an effective treatment for chronic low back pain. Several studies supported the effectiveness of exercise in chronic low back pain (Lewis et al., 2008). In addition, many recent studies strongly support that exercise has very positive effect on mental health. Stress, depression, anxiety and other negative emotional states can be reduced by exercise (Wand & Murry 2008, saxena et al., 2005). Therefore, it is recommended that exercise is an

effective treatment for reduction of pain and in the meantime, it improves mental health.

Very limited studies had been found how exercise reduces pain and simultaneously improve both psychological and biological states of stress in chronic low back pain (CLBP). This study was aim to find how exercise acts on psychological and biological system in order to reduce stress.

Chronic Low Back Pain and Stress

As like as other chronic pain, the nature of chronic back pain is complex and not purely physiological; psychological factors play a major role (Pincus & Newman, 2001). Low back pain is believed to be a stressful life experience that can be complicated by sick leave, unsure diagnosis, causing job and often marital life problems (Truchon et al., 2008). Patients with chronic low back pain perceived several stress related problem. Pain related fear is common in back pain patients. Pain related fear affects sufferers' daily activity and is closely related to the development of disability (Crombez, et al., 1999). A number of studies have found pain related fear to restrict the physical activity of low back pain patients. Pain has high negative effect for the affected individual and it is a salient threat, which eventually leads to pain related fear (Crombez, et al, 1999).

Most chronic low back pain patients experience emotional distress and feelings of anxiety, which may lead to long term disability (Adams, et al, 2005). Thus, people with low back pain are more vulnerable to develop anxiety and depression disorders. Chronicity of low back pain is related to higher levels of anxiety, depression and is a recognized source of stress (Umm et al., 2008, Mok & Lee, 2007).

Sullivan et al. (1992) reported that chronic LBP patients suffer depression three or four times more than the general population. However, most of the studies placed the emphasize on chronic pain treatment rather than depression treatment. Anti-depressants are used

frequently for chronic pain and mainly focus to reduce depression in order to help the pain. Different studies revealed that chronic pain rehabilitation is often not successful due to inadequate management of depression. Breivik and other colleagues (2006) conducted a large survey on 4839 people by computer assisted telephone interview in 15 European countries. They have found 24% of chronic pain patients in the UK suffer depression. The highest rate in Europe is in Spain where about 29% suffer depression.

Currie & Wang (2004) also reported that chronic low back pain patients are 6.2 times more depressed than normal pain free individuals are. Chronic pain, stress, life and work interference, emotional changes form a vicious cycle (Walker et al., 2006). Pain and negative emotions are intimately connected (Orbach et al., 1998). In addition studies have found that chronic low back pain patients lose their role in different social contexts including employment related, financial related, relationship, identity as well as their hope (Walker et al., 2006). Moreover, perceived stress is increased in chronic pain patients by other stressors such as sleep deprivation, financial crisis, legal conflicts, marital or family dysfunction (Uum et al. 2008).

HPA axis activation

The main biological system mediating the physiological response to stress is hypothalamo-pituitary-adrenal (HPA) axis (Schneiderman et al, 2005). Stress is associated with over activation of the HPA axis (Petrelluzzi, 2008). The HPA axis is the main hormone system activator and regulator, which in turn maintains the homeostatic balance in response to stressful stimuli (Cota, 2008).

Purpose of this study

The purpose of this study is to find out the different psychological and biological stress markers. Emotional state in relation to the physiological response of HPA axis in chronic low back pain was also observed.

Significance of the study

Chronic pain and stress are two more frequent health problems in the modern world. A large number of working people are affected by these conditions. In CLBP, both pain and stress form a vicious cycle, where the pain system interacts with the stress response system.

Ethical consideration

Ethical consideration was applied on all stages of this project including planning, conducting and evaluating of this study. Ethical approval was obtained from appropriate ethics committee

Methodology

This was an observational study to assess the stress level in normal and CLBP patients. The Participants used in this study were selected carefully. The aim was to select people from healthy medical background i.e. no back

pain and also to select people with chronic low back pain. Participants were recruited from the Roehampton university, London and as well as from inner London area. All participants took part voluntarily in this study. Participants recruited in this study were all male to exclude the variability of cortisol and DHEA levels in men and women. The ethnicity, racial characteristics of the participants were not considered. Twenty participants were recruited for this study. Ten participants were diagnosed with Chronic Low Back pain and 10 participants were healthy controls. Another investigator also collected data from this experiment for his study purpose.

Results

Level of pain- chronic low back pain participants had reported a significantly ($p \leq 0.05$) higher level of pain. In chronic low back pain mean pain level was 40 ± 20.43 mm whereas mean pain level was 2.6 ± 4.6 in control group. Chronic low back pain patients perceived more pain in general compared to healthy controls.

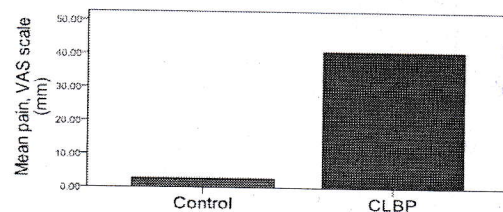


Figure- 2 Pain level: Subjective measure of pain by VAS scale at base line. (Control, n=10, CLBP, n=10). This figure shows that pain level is higher in chronic low back pain participants.

Pain catastrophizing

The bar graph below presents the differences of pain catastrophizing between control and chronic low back pain groups.

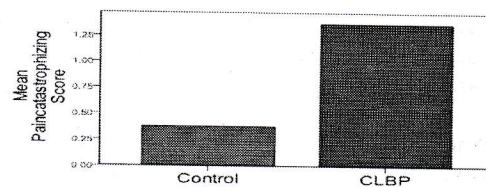


Figure- 3 pain catastrophizing scores in control (n=10) and chronic low back pain (n=10) groups. This figure shows that chronic low back pain patients had more pain catastrophizing. $P \leq 0.05$ in independent *t* test suggested the result was significant.

Negative emotional states

A 21 point Depression Anxiety and Stress (DASS 21, 7 points for each state) scale was used to assess perception of depression, anxiety and stress in healthy and chronic pain group. The graph below shows that mean depression, anxiety and stress scores are higher in the CLBP group.

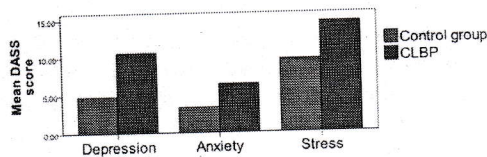


Figure 4: Level of depression, anxiety and stress in control (n=10) and CLBP (n=10) groups. This figure demonstrates that depression, anxiety and stress are higher in chronic low back pain group. Independent *t* tests were conducted and found *P* values were more than 5% in depression, anxiety, stress. These results suggested that differences between the groups were not statistically significant.

Positive and Negative Affect Schedule (PANAS)

In chronic low back pain group, there was a lower tendency to positive affect and nearly the same level of negative affect compared to the control group.

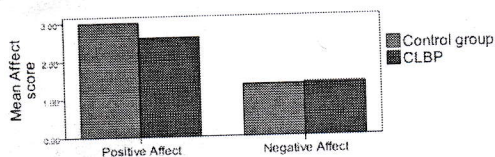


Figure 5- This table shows that control group has higher positive affect score than the CLBP group. However positive affect was not statistically significant, ($p=.37$). Base line negative affect was similar in two groups. This difference was also not statistically significant ($P=.94$).

Discussion

The purpose of this study was to find out the level of negative emotional states such as depression, anxiety, stress and positive affect, negative affect and biological stress markers such as cortisol and DHEA in chronic low back pain patients and healthy controls. It was expected that stress level would be high in chronic low back pain patients and exercise reduced psychological and biological markers of stress in chronic low back pain patients.

Baseline Emotional States, Positive Affect and Negative Affect

Pain level, pain catastrophizing were significantly different between two groups. This study found that pain level was higher in chronic low back pain participants. During the time of assessment, chronic low back pain patients had been experiencing more pain assessed by visual analogue (VAS) scale. This finding suggested that control group (M=2.6mm) and chronic low back pain group (M=20.43mm) were clearly distinguished by pain level.

The present study showed that chronic low back pain patients had significantly higher pain catastrophizing. Pain catastrophizing is a very common feature of chronic low back pain sufferer (Crombez et al., 1999). Borkum J.M (2010) reported higher pain catastrophizing in

chronic low back pain patients in his study. Chronic low back pain patients have fear of movement and anxiety. They think movement would increase or reproduce their pain level. Gradually their activities become limited and develop disability (Smeets et al, 2006). Leeuw et al (2006) reported that who are catastrophizing in pain also suffered in mental distress. They have higher level of anxiety and depression.

In general, chronic low back pain patients in this study were linked with pain catastrophizing and had tendency to more depression, anxiety and stress. These findings were similar to many previous studies. Breivik et al. (2006) suggested that chronic low back pain patients suffer more depression, anxiety and stress. In addition, they have more negative attitudes than normal control. Same findings also reported in other studies. Umm, et al (2008) also found similar result. Most chronic low back pain patients have experience emotional distress and feelings of anxiety, which may lead to other major complications including disability (Adams et al, 2005). Gallagher and Mossey (2001) did a survey and collected data from 4113 pain patients from different pain clinic. They found 1628 patients with diagnosis of low back pain and out of them 32% had diagnosis of depression. They found that stressful life events of CLBP lead to anxiety disorder and gradually developed depression (Schneiderman et al., 2005). This study showed that, there was a tendency of lower positive affect in chronic low back pain patients. Differences in negative affect did not find between the control and the chronic low back pain groups. Previous studies reported that Chronic pain was related to lower level of positive affect and higher level of negative affect (Zautra et al., 2005). However, results were obtained from this study not statistically significant.

Conclusion

The purpose of this study was to examine the negative emotional state and stress biomarkers of chronic low back pain patients. It was hypothesised that the chronic low back pain patients differed from the normal healthy controls both psychologically and biologically. The results from this experiment supported the hypotheses mentioned above. Chronic low back pain patients significantly differed in pain catastrophizing and pain level significantly differed between CLBP and normal healthy controls.

References

- Adams, N., Poole, H. and Richardson, C. (2005) 'Psychological Approaches to Chronic Pain Management', *Journal of Clinical Nursing*, 1, pp.290-300.
- Apkarian, A.V., Yamaya, S., Beth, R. K., Sebastian, P. T., Bruce E. F., Robert, E. L., Norman H. and Dante R. C. (2004) 'Chronic Pain Patients are Impaired on an Emotional Decision-Making Task', *Pain*, 108, pp. 129-136.
- Borkum, J.M. (2010) 'Maladaptive cognitions and chronic pain: epidemiology, Neurology, and treatment', *Journal of Rational - Emotive and Cognitive Behaviour Therapy*, 28, pp.4-24.

- Breivik, H., Beverly, C., Vittorio, V., Rob, C. and Derek, G. (2006) 'Survey of Chronic Pain in Europe: Prevalence, Impact on Daily Life and Treatment', *European Journal of Pain*, **10**, pp.287-333
- Burton A.K (2005) 'How To Prevent Low Back Pain', *Best Practice & Research Clinical Rheumatology*, **19**, 4, 541-555
- Cota, D. (2008) 'The Role of the Endocannabinoid System in the Regulation of Hypothalamic-Pituitary-Adrenal Axis'. *Journal of Neuroendocrinology*, **20**, pp.35-138
- Currie, S.R. and JianLi, W. (2004) 'Chronic Back Pain and Major Depression in the General Canadian Population', *Pain*, **107**, pp.54-60.
- Crombez, G., John, W.S., V., Peter, H.T.G. H. and Roland, L. (1999) 'Pain-Related Fear is More Disabling than Pain Itself: Evidence on the Role', *Pain*, **80**, pp.329-339.
- Cristiansen, K.H. (1998) 'Behavioural correlates of dehydroepiandrosterone and dehydroepiandrosterone sulphate', *The aging male*, **1**, pp.103-112.
- Gallagher, P., Leitch, M.M., Massey, A.E., Williams, R.H.M. and Young, A.H. (2006) 'Assessing Cortisol and Dehydroepiandrosterone (DHEA) in Saliva: Effects of Collection Method', *Journal of Psychopharmacology*, **20**, pp.663-649.
- Jellema, P., Nicole, R., Danie, A., W. M. Breivik H., Beverly, C., Vittorio, V., Rob, C. and Derek, G. (2006) 'Survey Of Chronic Pain in Europe: Prevalence, Impact on Daily Life, and Treatment', *European Journal of Pain*, **10**, pp.287-333.
- Leeuw, M., Houben, R.M.A., Severeijns, R., Picavet S.H., Schouten, E.G.W. and Vlaeyen, J.W.S (2006) 'Pain Related Fear in Low Back Pain: A Prospective Study in General Population', *European Journal of Pain*, **11**, pp.256-266.
- Lewis, A. E., Morris, M. And Walsh, C. (2008) 'Are Physiotherapy Exercises Effective in Reducing Chronic Low Back Pain?', *Physical Therapy Reviews*, **13**, pp.37-44.
- Macedo, L. G., Latimer, J., Maher, C. G., Hodges, P.W., Nicholas, M., Tonkin, L., McAuley J. H., and Stafford, R. (2008) 'Motor Control or Graded Activity Exercises for Chronic Low Back Pain', *BMC Musculoskeletal Disorders*, **65**, pp.1-9.
- Maher, C. G., Latimer, J., Hodges, P. W., Refshauge, K. M., Moseley, G. L., Herbert, R. D., Costa, L. O. and Auley, J. M. (2005) 'The Effect of Motor Control Exercise Versus Placebo in Patients with Chronic Low Back Pain', *BMC Musculoskeletal Disorders*, **6**, 54, pp.1-8.
- Mok, L.C. and Lee, K. (2007) 'Anxiety, Depression and Pain Intensity in Patients with Low Back Pain who are Admitted to Acute Care Hospitals', *Journal of Clinical Nursing*, **17**, pp.1471-1480.
- Mondelli, V. and Pariante, C.M. (2008) 'Hypothalamus-Pituitary Adrenal (HPA) axis and metabolic abnormalities in first episode psychosis'. *Current Psychiatry Reviews*, **4**, pp.185-189.
- Petrelluzzi, K. F. S., Garcia, C., Petta, C. A., Grassi-Kassisse, D. M., Pieper, D.R., Loboeki, C.A., Lichten, E.M. and Jadwiga, M. (1999) 'Dehydroepiandrosterone adn .
- Schneideman, N., Gail, I. and Siegel, S. (2005) 'Stress and Health: Psychological, Behavioral, and Biological', *Annu Rev Clin Psychol*, **1**, pp. 607-628.
- Smeets, R.J.E.M., Vlaeyen, J.W.S., Kester, adm. and Knottnerus, J.A. (2006) Reduction of pain catastrophizing mediates the outcome of both physical and cognitive-behavioral treatment in chronic low back pain', *The journal of pain*, **7**, pp. 261-271.
- Somerville, S., Elaine H., Martyn, L., Julie B., Danielle, W., Jonathan, H. and Gail S (2008) 'Content and Outcome of Usual Primary Care for Back Pain: A Systematic Review', *British Journal of General Practice*, pp.790 -797.
- Sullivan, M.J.L., Kenneth, R., Samuel, M. and Ronald, F. (1992) 'The Treatment of Depression in Chronic Low Back Pain: Review and Recommendations', *Pain*, **50**, pp.5-13.
- Trucho, M. D., Cote, L., Fillion., Arsenault, B. and Dionne, C. (2008) 'Low-Back-Pain Related Disability: an Integration of Psychological Risk Factors into the Stress Process Model', *Pain*, **137**, pp.564-573.
- Uum, S.H.M.V., Sauve, B., Fraser, L. A., Morley-Forster, P., Paul, T. L. And Koren, G (2008) 'Elevated Content of Cortisol in Hair of Patients with Severe Chronic Pain', *Stress*, **11**, 6, pp.483-488.
- Walker, J., Beatrice, S. and Immy, H. (2006) 'The Experience of Chronic Back Pain: Accounts of Loss in Those Seeking Help from Pain Clinics', *European Journal of Pain*, **10**, pp.199-207.
- Wand, N.E. and Connell, O. (2008) 'Chronic Non-Specific Low Back Pain - Sub-Groups or a Single Mechanism?', *Bmc Musculoskeletal Disorders*, **9**, p.1 .
- Watson, S. and Mackin, P (2006) 'HPA axis function in mood disorders', *Psychiatry*, **5**, pp.166-170.
- Zautra, A.J., Johnson, L.M. and Davis, M.C (2005) 'Positive affect as a source of resilience for women', *Journal of consulting and clinical psychology*, **73**, pp.212-220.