Journal of Medical Sciences

ISSN 1682-4474

science alert

ANSInet
an open access publisher
http://ansinet.com

Research Paper

J. Med. Sci., 9 (6): 257-263
15th August, 2009

JMS (ISSN 1682-4474) is an International, peer-reviewed scientific journal that publishes original article in experimental & clinical medicine and related disciplines such as molecular biology, biochemistry, genetics, biophysics, bio-and medical technology. JMS is issued eight times per year on paper and in electronic format.

For further information about this article or if you need reprints, please contact:

Ugur Cavlak
Pamukkale Üniversitesi,
Fizik Tedavi ve Rehabilitasyon,
Yüksekokulu Yeni Rektörlük
Binasi B Kati Kinikli Kampüsü,
20070 Denizli, Türkiye

Tel: 0090 258 296 23 00
Fax: 0090 258 296 23 22

ANSInet
Asian Network for Scientific Information

Relationship between Pain Intensity, Depressive Symptoms, Disability Level and Physical Functioning in Chronic Low Back Pain Turkish Patients: Gender Differences

[1]S. Sagmanli, [2]N. Yagci, [2]U. Cavlak and [3]A. Cetin

This study was conducted to examine the relationship between pain intensity, disability, emotional status and physical functioning and compare this relationship in men and women with Chronic Low Back Pain (CLBP). This study included 118 subjects (73 women and 45 men), with a mean age of 43.16±8.74 years. A Visual Analog Scale (VAS) was used to detect pain intensity. Depressive symptoms were evaluated using by the Beck Depression Inventory (BDI). The Oswestry Disability Index (ODI) was used to determine disability score of the subjects. Physical functioning was evaluated with the use of the Fifty-Foot Walk (FWS), the Sit to Stand (STS) and the Bend Forward Test (BFT). Significant differences were found between the females and males in all outcome measures ($p \leq 0.05$). The results showed that the women had higher pain intensity, depression and disability scores compared with men ($p = 0.0001$). On the other hand, the women had lower physical functioning test scores ($p = 0.0001$). The investigators detected the presence of a significant positive correlation between physical functioning measures and pain intensity, disability level and emotional status in both males and females.

Key words: Chronic low back pain, gender, pain intensity, disability, depressive symptoms

[1]University Hospital, Department of Physical Therapy, Hacettepe University, Ankara, Turkey
[2]School of Physical Therapy and Rehabilitation, Pamukkale University, Denizli, Turkey
[3]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Hacettepe University, Ankara, Turkey

INTRODUCTION

Chronic Low Back Pain (CLBP) is one of the most common musculoskeletal problems in modern societies. Nearly 80% of people experience Low Back Pain (LBP) during their life. LBP is the most common cause of activity limitation in people younger than 45 years. Females are more often affected by chronic low back pain and psychological impairments than males. The effects of gender on psychosocial measures were examined in a consecutive sample of 431 patients with chronic low back pain prior to rehabilitation. Females showed more psychological strain and pain-related impairments than males (Tlach and Hampel, 2009). In another study related to chronic pain, majority (63%) of sample (n = 716) was found to be female (Marcus, 2003). As can be understood very well from the previous studies the women complaint from chronic pain, especially chronic low back pain resulting from mechanic factors. Intervertebral disc lesion accounts for 45 of mechanic LBP (Deyo and Weistein, 2001). It commonly occurs in the L4-L5 or L5-S1 level. The intervertebral disc has an important role in providing stability between adjacent components in spinal column (Plastanga *et al*., 1998), necessary for normal performance during activities of daily living (Panjabi, 1992). Chronic pain is an individually variable experience, incorporating physical, psychological and social dimensions. Definitions based on pain history focus on pain persistence (e.g., episode duration, number of days with pain) (Merskey and Bogduk, 1994). Concurrent definitions employ multiple measures of pain intensity, interference with activities and psychosocial variables to identify patients with significant pain dysfunction (Turk and Rudy, 1990; Mok and Lee, 2008). Psychosocial factors, the so called yellow flags appear to predict development of chronic pain (Mc-Gill *et al*., 2003; Pincus *et al*., 2002). The severity of chronic pain demonstrated significant correlation with psychological impairment, depression, disability and time off work (Pfingsten *et al*., 2000; Gerbershagen *et al*., 2002). Structural, social and emotional factors are thought to contribute to CLBP illness. Depression is a clinical entity commonly seen in association with chronic pain such as LBP (Cherkin *et al*., 1996). In addition to this problems mentioned above, physical functioning also affected by chronic low back pain. This leads to decrease in motion ability, including walking, climbing stairs, sitting and, standing.

In this study, we investigated to investigate the relationship between pain intensity, disability level, emotional status and physical functioning in Turkish patients with CLBP.

MATERIALS AND METHODS

Patients: One hundred and eighteen patients aged 22-60 years with clinically diagnosed CLBP, confirmed by MRI or CT scan, participated in this randomized clinical trial study. The patients recruited from outpatient physical therapy department at Hacettepe University in Ankara. The inclusion criteria were CLBP, sciatic pain and reduced functional performance due to L4-L5 or L5 S1 disc herniation for more than 6 months. Patients were excluded from the study if they had severe neurological, metabolic, cardiovascular, mental or psychiatric diseases, back surgery, motor and sensory dysfunction due to Caudal Equine Syndrome, a major structural abnormality (e.g., kyph-oscoliosis), or pregnancy.

All patients gave their informed consent for participating to the study. Each patient was evaluated by the same physical therapist. Our study was performed between April 2006 and November 2008.

Outcome measures: Patients completed a series of self-report measures before testing. In addition to three outcome measures (pain intensity, disability and depression), three physical performance tests were also performed by the subjects.

Pain intensity: The Visual Analog Scale (VAS) has been widely used in pain research and demonstrates good reliability, validity and responsiveness (Jensen *et al*., 1994; Ogon *et al*., 1996). A VAS 100 mm horizontal pain with 2 word descriptors at either limit of the scale no pain at the left-hand side and maximum pain at the right-hand side was employed to assess current pain intensity (Price *et al*., 1983). The VAS values are numerically quantified as follows; 0: no pain; 1-4: mild pain; 5-6: moderate pain; 7-9: severe pain; 10: maximum pain.

Disability level: The Oswesty Disability Index (ODI) (Fairbank *et al*., 1980) mainly assesses activity limitations and contains 10 different items-pain intensity, personal hygiene, lifting, walking, sitting, standing, sleeping, sexual activity, social activity and traveling which all were scored on a six-point scale, with 0 representing no limitation and 5 representing maximal limitation. A percentage score from 0 to 100 is calculated (higher score shows higher disability). The 0 to 20% - minimal disability 20 to 40% - moderate disability, 40 to 60% - severe disability, 60 to 80% - crippled, 80 to 100% - bed bound (or exaggerating symptoms). In our study, the Turkish version of the ODI was used to determine disability level of the subjects (Yakut *et al*., 2004).

Emotional status: Depressive symptoms were detected using by the Beck Depression Inventory-Turkish version (BDI) (Hisli, 1988) which is a self-report measure of cognitive, affective and neurovegetative symptoms of depression. It is composed of 21 groups of 4 statements about how respondents might have been feeling during the past week. The BDI possesses adequate internal consistency in psychiatric and non psychiatric samples and is a well-validated measure. The BDI statements were ranked from 0 to 3, with 0 representing least serious and 3 the most serious symptoms. The cutoffs used differ from the original: 0-13: minimal depression; 14-19: mild depression; 20-28: moderate depression; and 29-63: severe depression. The cut off point for Turkish population is ≤17.

Physical performance tests

Walking velocity: The Fifty-Foot Walk Test (FWS) is a measure of gait velocity and function (Grace *et al*., 1988). For this test, subjects were timed as they walked 25 feet, turned around and walked back to the starting position at their preferred walking speed. Subjects were instructed to walk this distance as fast as they comfortable could without an assistive device. Time was measured by chronometer (Silva *et al*., 2008).

Balance ability: The Sit-to Stand (or chair rise) Test (STS) is commonly used to assess lower extremity strength and balance (Lord *et al*., 2002). Whitney *et al*. (2005) reported that various methods have been used in an attempt to determine how well older adults can rise from a chair. These tests were timing one chair rise with the use of arms or without use of arms, timing three chair rises or five chair rises. We used five times of the STS test. The patients began by crossing their arms on their chest and sitting with their back against the chair (45 cm higher from the floor). The chair was padded, armless and its back was supported against a wall. The same chair was used for all patients. The patients began while they were in the seated position and ended in the seated position. The patients were prompted not to bounce off the chair when returning to the standing position and reminded to fully straighten their legs when elevating. The adults were instructed to stand up and sit down five times as quickly as possible (Holzberg *et al*., 1996). The scores of the two trials were recorded for each subject with a rest between every two trials. This test was measured by a chronometer. The mean of the two scores was calculated (Eriksrud and Bohannon, 2003).

Muscle endurance: This test requires the subject to bend forward (as if touching his/her toes) and as fast as tolerated, return to standing 10 times. The test is repeated after a brief pause and the average time of the two tests are the resulting score.

Statistical analysis: The data were analyzed using SPSS 13.0 statistical software (SPSS Inc., Chicago, IL). Descriptive Statistics, including Mean±SD and frequencies (count and percentage) were calculated (Sumbuloglu and Sumbuloglu, 2007). The statistical differences between the means of variables in two sexes were compared with Mann Whitney U test or Independent Samples t test when appropriate. Pearson's correlation coefficients were used to express the relationship between pain intensity, disability and depressive symptoms. Interpretation of correlation coefficients was as follows: $r \leq 4.49$, weak relationship; $0.50 \leq r \leq 0.74$ moderate relationship; and $r \geq 0.75$, strong relationship. The statistical significance was set at 5% level ($p \leq 0.05$).

RESULTS

Characteristics and descriptive statistics of the patients are presented in Table 1. No differences were found in terms of age and BMI scores between female and male subjects. In CLBP patients the self-reported back pain intensity (VAS) ranged from 0.5 to 8.0 (Mean = 3.88±1.66) indicating intermediate pain during testing. The women reported higher scores about pain intensity and depressive symptoms than the men. While 30.1% of the females reported severe pain, only 11.1% of the males reported severe pain according to the VAS. Minimal depressive symptoms (mean score; 13.75) were described in female and male participants (mean score; 8.44). The differences in terms of pain intensity and depressive symptoms between females and males were significant ($p = 0.0001$). The physical functioning scores belonging to the male subjects were lower than the females' scores ($p = 0.0001$). The 44.9% of the sample had moderate disability score. The females had higher disability scores compared with males ($p = 0.038$). The relationships between outcome measures of the sample are presented in Table 2. Significant positive correlations were found among the following six parameters; pain intensity, disability level, depressive symptoms, FSW, STS and BFT ($p = 0.001$). Table 3 shows the significant positive correlations among the outcome measures in females except between STS and depressive symptoms ($p = 0.001$). Table 4 shows the significant positive correlations among the outcome measures in male subjects ($p = 0.001$) except between STS and depressive

Table 1: Demographic data at study entry (n = 118)

Variables	Totally (n = 118)	Females (n = 73)	Males (n = 45)	*p-value
	(Mean±SD)			
Age (year)	43.16±8.74	44.10±7.43	41.62±10.44	NS
Height (m)	166.87±9.89	160.83±5.57	176.66±7.14	0
Weight (kg)	76.38±13.21	70.61±5.57	85.73±10.99	0
BMI (kg cm^{-2})	27.37±3.89	27.50±4.28	27.16±3.20	NS
FSW (sec)	27.25±3.86	28.32±3.98	25.52±2.97	0
STS (sec)	14.31±4.15	15.53±4.32	12.32±2.94	0
BF (sec)	24.54±5.63	26.29±5.80	21.70±3.97	0
BDI	11.72±7.60	13.75±7.62	8.44±6.37	0
ODI	13.49±6.92	14.83±7.16	11.31±5.98	0.007
VAS	3.88±1.66	4.12±1.72	3.48±1.49	0.04

	Totally (n = 118)		Females (n = 73)		Males (n = 45)		
Variables	n	%	n	%	n	%	*p-value
Pain intensity**							
Mild	54	45.8	30	41.1	24	53.3	
Moderate	37	31.4	21	28.8	16	35.6	
Severe	27	22.9	22	30.1	5	11.1	0.057
ODI**							
Minimal	49	41.5	24	32.9	25	55.6	
Moderate	53	44.9	39	53.4	14	31.1	
Severe	16	13.6	10	13.7	6	13.3	0.016

NS: Not significant, BMI: Body mass index, FSW: Fifty-foot walk test, STS: Sit to stand test, BF: Bend forward test, BDI: Beck depression inventory, ODI: Oswestry disability index, *Two independent samples t-test was used. **Chi Square test was used

Table 2: Bivariate correlations (Pearson) between disability, pain intensity, depression and physical performance tests (all participants)

Outcomes	1	2	3	4	5	6
Pain intensity	-					
Disability	0.793*	-				
Depression	0.554*	0.588*	-			
FSW	0.610*	0.629*	0.548*	-		
STS	0.515*	0.572*	0.375*	0.658*	-	
BF	0.616*	0.669*	0.486*	0.701*	0.876*	-

*Correlation is significant at the 0.01 level. FSW: Fifty-foot walk test, STS: Sit to stand test, BF: Bend forward test. 1: Pain intensity, 2: Disability, 3: Depression, 4: FSW, 5: STS, 6: BF

Table 3: Spearman correlations between disability, pain intensity, depression and physical performance tests (female participants)

Outcomes	1	2	3	4	5	6
Pain intensity	-					
Disability	0.768*	-				
Depression	0.567*	0.634*	-			
FSW	0.632*	0.632*	0.528*	-		
STS	0.572*	0.575*	0.360	0.627*	-	
BF	0.651*	0.659*	0.494*	0.697*	0.863*	-

*Correlation is significant at the 0.01 level. FSW: Fifty-foot walk test, STS: Sit to stand test, BF: Bend forward test. 1: Pain intensity, 2: Disability, 3: Depression, 4: FSW, 5: STS, 6: BF

Table 4: Spearman correlations between disability, pain intensity, depression and physical performance tests (male participants)

Outcomes	1	2	3	4	5	6
Pain intensity	-					
Disability	0.862*	-				
Depression	0.429*	0.360*	-			
FSW	0.490*	0.473*	0.377*	-		
STS	0.275	0.449*	0.151	0.516*	-	
BF	0.452*	0.644*	0.255	0.482*	0.797*	-

*Correlation is significant at the 0.01 level. FSW: Fifty-foot walk test, STS: Sit to stand test, BF: Bend forward test. 1: Pain intensity, 2: Disability, 3: Depression, 4: FSW, 5: STS, 6: BF

symptoms and pain intensity. At the same time, there was no significant relation between BFT score and depressive symptoms in male subjects.

DISCUSSION

Depression is directly related to both physical and psychosocial functioning of patients with pain (Holzberg *et al*., 1996). Almost all working adults, more than half in any given year, experience LBP (Rives and Douglass, 2004). The etiology of CLBP has been shown to be multi-factorial. The BDI-21 can be used to generate important information about the severity of interference posed by pain on the functioning of an individual. The importance of the BDI to clinicians and clinical scientists has been demonstrated in earlier use of the psychometric device in the context of LBP. Wesley *et al.* (1999) explained that the BDI may prove to be a more accurate measurement of depression in patients with CLBP.

Pain intensity is an important domain directly related to LBP (Ostelo and De-Vet, 2005). An assessment of back pain using the VAS is responsive enough to detect minimally clinically important differences (Hagg *et al*., 2003). The combined use of the BDI with the VAS has been used in the literature. Guermazi *et al.* (2005) studied a population of CLBP suffers using impairment outcome measures by assessing pain as measured on a VAS and incorporating the BDI scores. Kjellby-Wendt *et al.* (1999) found by using the VAS and BDI psychometric analysis was a valuable tool for predicting the outcome of surgical treatment for lumbar disc hernia. The data in Table 1 describes how BDI scores are to be interpreted. The results from this study indicated that all subjects had a moderate disability (44.9%). According to Burns (1980), a score under 10 from the 21-question BDI indicated this

level of negative thought to be within a normal range. Present results indicated that a moderate level of pain from the VAS associated with the low back accounts. Present finding about The BDI scores is consistent with previous study, which has showed that stronger relationship between level of the pain intensity and disability in patients with CLBP (Turner and Clancy, 1986).

The beliefs that one is temporarily disabled with CLBP and that any activity should be avoided because pain would signify damage has been associated positively with physical disability (Jensen *et al*., 1994). Findings of previous researchers have revealed a higher prevalence of disability among women, as well as sex differences in physical-medical and psychosocial variables influencing pain and disability (Aceves-González and Prado-Leon, 2008). Evidence of gender differences in how pain is perceived might elucidate rehabilitation outcome differences between male and female patients and serial investigations suggest that there are clear gender differences in the perception of pain attributable to biological, psychological and social factors (Defrin *et al*., 2009; Stutts *et al*., 2009). Some others conclude that, although their results suggest gender-related physiological differences in how pain is perceived, there may also be differences in psychological factors (e.g., anxiety, stress and depression) that could contribute to a relative somatosensory amplification of painful stimuli resulting in the variation in pain perception (Chenot *et al*., 2008). In this present study, we found that the women reported higher depressive symptoms and disability scores because of their higher pain intensity compared with the men. A variable relationship has been observed in chronic pain patients between the disability experienced in daily activities and the severity of pain. Results from several studies on groups of patients with chronic pain have suggested that the correlation between overall subjective disability and pain intensity is low moderate, with only partial overlap. Huge *et al.* (2006) were able to show that study indicates that the degree to which pain interferes with various daily activities, such a recreation, social activities and occupation. Kovacs *et al.* (2007) found that there was a weak but highly significant correlation between pain, disability and quality life in patients with low back pain. Simmonds *et al.* (1998) compared 44 subjects with low back pain and 48 healthy pain-free subjects. They found there was a strong correlation between pain and disability, whereas a modest correlation between pain and performance tests. We also used more or less the same parameters to evaluate the CLBP subjects in our study. Moreover, we obtained the similar results to Simmonds's study. We also investigated the gender differences. Then, the results showed that the male subjects had lower physical performance scores. Namely, the males had better physical performance than the female subjects ($p = 0.0001$). Novy *et al.* (2002) investigated endurance-strength factors correlated with numeric rating of pain intensity. The speed-coordination factor had only trivial amount of overlap with pain intensity. Considering these correlations together, it appears that there are 3 overlapping limiting aspects of physical performance: perceived physical disability, lack of self efficacy and negative affect. In the study of Verbunt *et al.* (2005) both the level of physical activity and decline in activity seemed more important in the explanation of disability in patient with an active lifestyle before their back pain started as compared with patients with formerly sedentary lifestyle.

We found that there was a significant relation between pain severity and physical performance, depression and disability level. In our study, physical performance test (STS, BFT and FWS) scores, disability level (ODI) and depressive symptoms (BDI) were high correlated with pain in CLBP patients.

REFERENCES

Aceves-González, C. and L.R. Prado-Leon, 2008. Low back pain and depression: A study in a population of Mexican workers. Work, 31: 159-166.

Burns, D.D., 1980. Feeling Good: The New Mood Therapy. Harper-collins Publishers, New York, USA., ISBN: 0-380-81033-6, pp: 40-41.

Chenot, J.F., A. Becker, C. Leonhardt, S. Keller and N. Donner-Banzhoff *et al*., 2008. Sex differences in presentation, course and management of low back pain in primary care. Clin. J. Pain, 24: 578-584.

Cherkin, D.C., R.A. Deyo, J.H. Street and W. Barlow, 1996. Predicting poor outcomes for back pain seen in primary care using patients own criteria. Spine, 21: 2900-2907.

Defrin, R., L. Shramm and I. Eli, 2009. Gender role expectations of pain is associated with pain tolerance limit but not with pain threshold. Pain, 145: 230-236.

Deyo, R.A. and J.N. Weistein, 2001. Low back pain. New Engl. J. Med., 344: 363-370.

Eriksrud, O. and R.W. Bohannon, 2003. Relationship of knee extension force to independence in Sit-to-stand performance in patients receiving acute rehabilitation. Phys. Ther., 83: 544-551.

Fairbank, J.C.T., J. Couper and J.B. Davies, 1980. The oswestry low back pain questionnaire. Physiotherapy, 66: 271-273.

Gerbershagen, H.U., G. Lindena, J. Korb and S. Kramer, 2002. Health-related quality of life in patients with chronic pain. Schmerz, 16: 271-284.

Grace, E.M., E.M. Gerecz, Y.B. Kaassam, H.M. Buchanan, W.W. Buchanan and P.S. Tugwell, 1988. 50-foot walking time: A critical assessment of an outcome measure in clinical therapeutic trials of antirheumatic drugs. Br. J. Rheumatol., 27: 372-374.

Guermazi, M., M. Mezghani, S. Ghroubi, M. Elleuch, A.O. Med and S. Poiraudeau, 2005. The Oswestry index for low back pain translated into Arabic and validated in an Arab population. Ann. Readapt. Med. Phys., 48: 1-10.

Hagg, O., P. Fritzell and A. Nordwall, 2003. Swedish lumbar spine study group: The clinical importance of changes in outcome scores after treatment for chronic low back pain. Eur. Spine. J., 12: 12-20.

Hisli, N., 1988. Beck Depresyon Envanteri'nin geçerliliði üzerine bir çaliþma. Psikoloji Dergisi, 6: 118-122.

Holzberg, A.D., M.E. Robinson, M.E. Geisser and H.A. Gremillion, 1996. The effects of depression and chronic pain on psychosocial and physical functioning. Clin. J. Pain, 12: 118-125.

Huge, V., U. Schloderer, M. Steinberger, B. Wuenschmann, P. Schöps, A. Beyer and S.C. Azad, 2006. Impact of a functional restoration program on pain and health-related quality of life in patients with chronic low back pain. Pain Med., 7: 501-508.

Jensen, M.P., J.A. Turner, J.M. Romano and B.K. Lawler, 1994. Relationship of pain specific beliefs to chronic pain adjustment. Pain, 57: 301-309.

Kjellby-Wendt, G., J.R. Styf and S.G. Carlsson, 1999. The predictive value of psychometric analysis in patients treated by extirpation of lumbar intervertebral disc herniation. J Spinal Disord., 12: 375-379.

Kovacs, F.M., V. Abraira, A. Royuela, J. Corcoll and L. Alegre *et al*., 2007. Minimal clinically important change for pain intensity and disability in patients with nonspecific low back pain. Spine, 32: 2915-2920.

Lord, S.R., S.M. Murray, K. Chapman, B. Munro and A. Tiedemann, 2002. Sit-to-stand performance depends on sensation, speed, balance and psychological status in addition to strength in older people. J. Gerontol. A. Biol. Sci. Med. Sci., 57: 539-543.

Marcus, D.A., 2003. Gender differences in chronic pain in a treatment-seeking population. J. Gend. Specif. Med., 6: 19-24.

Mc-Gill, S., S. Grenier, M. Bluhm, R. Preuss, S. Brown and C. Russel, 2003. Previous history of LBP with work loss is related to lingering deficits in biomechanical, physiological, personal, psychosocial and motor control characteristics. Ergonomics, 46: 731-746.

Merskey, H. and N. Bogduk, 1994. Classification of Chronic Pain: Descriptions of Chronic Pain Syndromes and Definitions of Pain Terms WA. IASP Press, Seattle, ISBN: 0931092051, pp: 210.

Mok, L.C. and I.F.J. Lee, 2008. Anxiety, depression and pain intensity in patients with low back pain who are admitted to acute care hospitals. J. Clin. Nurs., 17: 1471-1480.

Novy, D.M., M.J. Simmonds and C.E. Lee, 2002. Physical performance tasks: What are the underlying constructs? Arch. Phys. Med. Rehabil., 83: 44-47.

Ogon, M., M. Krismer, W. Söllner, W. Kantner-Rumplmair and A. Lampe, 1996. Chronic low back pain measurement with visual analogue scales in different settings. Pain, 64: 425-428.

Ostelo, R.W. and H.C. De-Vet, 2005. Clinically important outcomes in low back pain. Best Pract. Res. Clin. Rheumatol., 19: 593-607.

Panjabi, M.M., 1992. The stabilization of the spine. Part 1. Function, dysfunction, adaptation and enhancement. J. Spinal Disord., 5: 383-389.

Pfingsten, M., P. Schops, T. Wille, L. Terp and J. Hildebrandt, 2000. Classification of chronic pain. Quantification and grading with the Mainz Pain Staging System. Schmerz, 14: 10-17.

Pincus, T., A.K. Burton, S. Vogel and A.P. Field, 2002. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. Spine, 27: 109-120.

Plastanga, N., D. Fields and N. Soames, 1998. Anatomy and Human Movement: Structure and Function. 6th Edn., Butterworth-Heinemann, Oxford, pp: 660-670.

Price, DD., P.A. Mcgrath, A. Rafi and B. Buckinghom, 1983. The validation of visual analoque scales as ratio scale measures for chronic and experimental pain. Pain, 17: 45-46.

Rives, P.A. and A.B. Douglass, 2004. Evaluation and treatment of low back pain in family practice. J. Am. Board Fam. Pract., 17: 23-31.

Silva, L.E., V. Valim, A.P.C. Pessanha, L.M. Oliveira, S. Myamoto, A. Jones and J. Natour, 2008. Hydrotherapy versus conventional Land-based exercise for the management of patients with osteoarthritis of the knee: A randomized clinical trial. Phys. Ther., 88: 12-21.

Simmonds, M.J., S.L. Olson, S. Jones, T. Hussein, C.E. Lee, D. Novy and H. Radwan, 1998. Psychometric characteristics and clinical usefulness of physical performance tests in patients with low back pain. Spine, 23: 2412-2421.

Stutts, L.A., R.C. Mc-Culloch, K. Chung and M.E. Robinson, 2009. Sex differences in prior pain experience. J. Pain, 10: S11-S11.

Sumbuloglu, K. and V. Sumbuloglu, 2007. Biyoistatistik. 12th Edn., Hatiboglu, Ankara, Turkey, ISBN: 9757527122.

Tlach, L. and P. Hampel, 2009. Gender Differences in Psychosocial Variables in Inpatient Orthopedic Rehabilitation of Chronic Low Back Pain. Psychother Psychosom Med. Psychol., 27: 489-501.

Turk, D.C. and T.E. Rudy, 1990. Neglected factors in chronic pain treatment outcome studies-referral patterns, failure to enter treatment and attrition. Pain, 43: 7-25.

Turner, J.A. and S. Clancy, 1986. Strategies for coping with chronic low back pain: Relationship to pain and disability. Pain, 24: 355-364.

Verbunt, J.A., J.M. Sieben, H.A. Seelen, J.W. Vlaeyen, E.J. Bousema, G.J. van der Heijden and J.A. Knottnerus, 2005. Decline in physical activity, disability and pain-related fear in sub-acute low back pain. Eur. J. Pain, 9: 417-425.

Wesley, A.L., R.J. Gatchel, J.P. Garofalo and P.B. Polatin, 1999. Toward more accurate use of the Beck Depression Inventory with chronic back pain patients. Clin. J. Pain, 15: 117-121.

Whitney, S.L., D.M. Wrisley, G.F. Marchetti, M.A. Gee, M.S. Redfern and J.M. Furman, 2005. Clinical measurement of sit-to-stand performance in people with balance disorders: Validity of data for the five-times-sit-to-stand test. Phys. Ther., 85: 1034-1045.

Yakut, E., T. Düger, C. Oksüz, S. Yörükan and K. Ureten *et al*., 2004. Validation of the Turkish version of the Oswestry Disability Index for patients with low back pain. Spine, 29: 581-585.