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AUTONOMIC STATUS AND PAIN PROFILE IN PATIENTS OF CHRONIC LOW BACK PAIN AND FOLLOWING ELECTRO ACUPUNCTURE THERAPY: A RANDOMIZED CONTROL TRIAL

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Abstract : Pain is a syndrome characterized by several neurophysiological changes including that of the autonomic nervous system. Chronic low back pain (LBP) is a major health problem and is a frequent reason for using unconventional therapies especially acupuncture. This study was conducted to evaluate the autonomic status and pain profile in chronic LBP patients and to observe the effect of electro acupuncture therapy. Chronic LBP patients (n=60) were recruited from the Department of Orthopaedics, GTB Hospital, Delhi. Age and sex matched healthy volunteers were selected as controls (n=30). Following a written consent, LBP patients were randomly allocated into two study groups – Group A received 10 sittings of electro acupuncture, on alternate days, at GB and UB points selected for back pain, while the Group B received a conventional drug therapy in the form of oral Valdecoxib together with supervised physiotherapy. Controls were assessed once while the patients were assessed twice, before and after completion of the treatment program (3 weeks). The autonomic status was studied with non-invasive cardiovascular autonomic function tests which included E: I ratio, 30:15 ratio, postural challenge test and sustained handgrip test. Pain intensity was measured with the visual analogue scale (VAS) and the global perceived effect (GPE). Statistical analysis was performed using repeated measure's ANOVA with Tukey's test. Pain patients showed a significantly reduced vagal tone and increased sympathetic activity as compared to the controls ($P<0.05$ to $P<0.001$ in different variables). Following treatment, both the study groups showed a reduction in vagal tone together with a decrease in the sympathetic activity. There was also a considerable relief of pain in both groups, however, the acupuncture group showed a better response ($P<0.01$). We conclude that there is autonomic dysfunction in chronic LBP patients. Acupuncture effectively relieves the pain and improves the autonomic status and hence can be used as an alternative/ additive treatment modality in these cases.

Key words : chronic low back pain, autonomic status, pain profile, electro acupuncture

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INTRODUCTION

Chronic low back pain (LBP) is defined as pain that persists longer than 12 weeks and is often attributed to degeneration or traumatic conditions of the spine. Men and women are affected equally, though women report low back symptoms more often. It is the most common cause of disability in persons less than 45 years of age, and thus, is the most expensive benign condition in industrialized countries. The evolution of chronic LBP is a complex milieu influenced by various endogenous and exogenous factors, which create a condition that alters productivity of the individual beyond the initiating pathologic dysfunction. Epidemiologic studies suggest that risk factors include involvement in occupations that require repetitive lifting with sustained posture, exposure to vibration caused by industrial machinery, cigarette smoking and morbid obesity (1).

Under physiological conditions there exists almost no influence of autonomic activity on sensory neurons projecting to skin and deep somatic tissue but after any peripheral injury or inflammation, considerable hyper-excitability of spinal neurons is observed, as somato autonomic interactions occur in various neuronal systems on the same side. Such interactions have been shown between nociceptive and autonomic nervous system at several levels of the nervous system including the periphery, spinal cord, brainstem and also in the forebrain. Thus visceral or noxious inputs activate various nociceptive and autonomic regulatory regions of the CNS to initiate autonomic, behavioral and antinociceptive responses (2).

Although alteration in autonomic nervous activity has been associated with pain, yet little information is available on changes in autonomic status of patients with painful conditions. Bioardi et al (3) studied autonomic function in cluster headache and confirmed the autonomic dysfunction in these patients, particularly regarding the parasympathetic system. In their study, on patients of chronic inflammatory demyelinating polyradiculopathy, Lyu et al (4) found abnormal blood pressure response to sustained handgrip which is also suggestive of mild autonomic dysfunction.

Although, LBP is usually a self-limiting and benign disease that tends to improve spontaneously over time, a large variety of therapeutic interventions are available. However, the effectiveness claimed for most of these interventions have not been convincingly demonstrated and consequently, the therapeutic management of LBP varies widely. There are many therapeutic strategies but long term effects of single therapeutic approaches remain limited. Drug therapy is one of many possible treatment choices for symptomatic relief in patients with low back pain. Drug therapy generally does not alter anatomy or organ function but it may have important physiological effects on inflammation, muscle relaxation, neurotransmitter balance or central pain perception. Several non steroidal anti-inflammatory drugs (NSAIDS) have been tested in clinical trials for LBP, and the advent of the highly selective COX-2 inhibitors has generated considerable excitement because of the possibility that these new NSAIDS will be much safer than previous non selective COX inhibitors. Coats et al (5) in their study evaluated the effect

of Valdecoxib in the treatment of chronic LBP and concluded that it provides significant relief and decreases disability as compared to placebo. Physical therapy for LBP includes spinal manipulation, electric muscle stimulation, traction, physiotherapy, exercise and heat or ice therapy. Various studies suggest that the positive impact of exercise on back pain does not depend on improving strength and flexibility but on changing the patient's attitudes towards their disability and pain (6).

Low back pain is a frequent reason for using unconventional therapies especially acupuncture. Needle acupuncture is a traditional Chinese art of healing which involves the insertion of fine needles through specific points of the skin and then twirling them for some time at a slow rate. Electro-stimulation is being used commonly for treatment of various diseases and works on the same principles with the added advantage of stimulating a larger field around the acupuncture point. Carlsson et al (7) randomly allocated patients to one of the following three treatment groups: manual acupuncture, needle electro acupuncture and placebo stimulated. They demonstrated a long term pain-relieving effect of needle acupuncture compared with true placebo in patients with chronic LBP. In a recent study on tackling persistent LBP in primary care the following approach was recommended: advice and a stepped approach to analgesics with referral to a pain specialist if longer-term strong opioids are required. In addition, patients should also be offered up to 12 weeks of one of the following: tailored exercises, manual therapy; or acupuncture (8). Therefore, in this study we evaluated the autonomic status and pain profile of chronic LBP patients and observed the effectiveness of electro acupuncture therapy in its management.

MATERIALS AND METHODS

Subjects

The study was conducted on 60 patients of chronic low back pain. They were selected from the Orthopedics out patient department (OPD) and the study was conducted in the Departments of Physiology and Anesthesiology, Critical Care and Pain Management, University College of Medical Sciences and GTB Hospital, Delhi. Adult subjects in the age group of 30-50 years, of both sexes, with a history of moderate to severe intensity, non-radiating low back pain of 6 months or longer duration, without apparent neurological deficit or any prior history of acupuncture therapy, were selected. To remove bias, with the help of a computer generated randomization list, the patients were divided in two study groups of 30 patients each as follows :–

- Group A – received electro acupuncture.
- Group B – received conventional therapy.

Age and sex matched healthy volunteers from the same socio-economic status were included as controls (Group C).

Informed written consent of the procedure to be performed was taken from all the subjects and healthy volunteers. All subjects and controls were tested under similar laboratory conditions. They were allowed to get familiarized with the experimental and environmental conditions

of the laboratories and procedures were explained to them. The study groups were investigated twice, before and after treatment, while the control group was investigated once.

Autonomic function tests

Tests of autonomic functions have been proposed, formulated and standardized by various workers and are currently used in autonomic laboratories. The tests are both invasive and non-invasive and a combination of these are generally used (9). In this study the following non-invasive cardiovascular autonomic tests were performed in which, the ECG was recorded from standard leads using the student physiograph machine (INCO), while the blood pressure was measured with a mercury sphygmomanometer by the standard Riva-Roci method. The findings of these tests were noted in a proforma.

i) Heart rate variation during respiration or the E:I Ratio: The subject was asked to lie quietly supine for 1 minute with the ECG leads (lead – II) applied and connected to the physiograph machine. After a verbal command the subject started to breathe deeply and continuously at a rate of 6 breaths per minute (5 second inspiration and 5 second expiration). The result was expressed in terms of a ratio of an average of six maximum R-R intervals during expiration to an average of six minimum R-R intervals during inspiration.

ii) 30:15 Ratio: After making the subject lie supine for about 5 minutes he/she was asked to stand up unaided and erect as quickly as possible. During this period continuous lead – II ECG was recorded and the point at the start of standing was marked on the physiograph. The 30:15 ratio was calculated by taking the ratio of maximum R-R interval around 30^{th} beat to minimum R-R interval around 15^{th} beat after standing.

iii) Postural challenge test (PCT): Two non-invasive blood pressure readings were taken in the supine position after a 5 minute rest. The subject was then asked to stand up unaided and unsupported for 2 minutes at the end of which blood pressure was again recorded. The changes in systolic and diastolic blood pressures were calculated.

iv) Sustained handgrip test (SHT): The test was performed in the sitting position and three basal blood pressure readings were taken. The maximum voluntary contraction was then determined with the handgrip dynamometer using the dominant hand of the subject. Handgrip was then maintained at 30% of his/her maximum voluntary capacity for 2-3 minutes. Blood pressure was recorded on the contra lateral arm every minute during handgrip. The highest diastolic blood pressure during hand grip exercise and the mean of the 3 blood pressure readings before the handgrip began, were noted.

Pain profile

The pain intensity was measured using the following :

i) Visual analogue scale (VAS): It consists of a 10 cm horizontal line with the two

endpoints labeled “no pain” and “worst pain”. The subjects were asked to place a mark on the line at a point which corresponds to the level of their pain intensity. The distance in cm from the low end of the VAS to the patient’s mark is used as numerical index of the severity of pain.

ii) Global perceived effect (GPE): This is a seven point scale with markings from 1-7, 1 corresponding to “worst pain” and 7 corresponding to the “best ever”. The subjects were asked to rate their GPE.

Treatment modality of chronic low back pain patients

Group A: This group was subjected to electro acupuncture according to the traditional Chinese technique in the Pain Clinic of the Department of Anaesthesiology and Critical Care, GTB Hospital. Pre-sterilized disposable filiform needles, of 30 gauge and 2 inch were used. The patients during acupuncture were asked to lie prone with their back exposed. The exposed skin was cleaned before needling. The needles were inserted directly through the skin to various acupuncture points according to traditional Chinese channels and collaterals for chronic low back pain. The ten points selected were UB- 23, 24, 36, 37, 40, 57 and 60 on the urinary bladder meridian, GB-30 and 34 on the gall bladder meridian and GV-4 on the governor vessel (10). The needles were stimulated electrically from a battery powered electro stimulator providing a rectangular wave pulse and a current of 0.5 mA; an output of 6-9 volts was delivered at 10-20 Hz for 20 min. All subjects received a total of 10 sittings delivered on alternate days.

Group B: This group received conventional therapy. Subjects were given Valdecoxib 20 mg BD for 10 days together with supervised physiotherapy by a qualified physiotherapist for 3 weeks. The physiotherapy included strengthening exercises and lumbar extension training to improve low back strength, like stretching the lower back muscles, partial sit-ups and pelvic lift.

Statistical analysis

The data was analyzed using the repeated measure’s ANOVA with Tukey’s test at 5% level of significance to compare between and within group A and group B. One-way ANOVA followed by Tukey’s test was used to compare mean of basic parameters among the three groups. Since the basic parameters are not statistically significant among the groups, to compare the autonomic functions with control group, the group A and B were combined. The unpaired t-test was also used to compare control group versus study group before treatment for all continuous variables. Chi–square test was used to compare the proportion of the gender among the three groups. All tests were two-tailed. $P<0.05$ was considered to be significant. All analysis was done using SPSS 17.0. Results are expressed as mean±SD.

RESULTS

Basal parameters are depicted in Table I. The mean (±SD) age of the sample studied was 35.50±5.24 years and consisted of 33 (37%) men and 57(63%) women. There was no significant difference in mean age and sex ratio between the various groups. There was also no significant difference between

the body weight , BMI and the basal heart rate of the subjects, as all these basic parameters are likely to influence the autonomic functions. The duration of pain (mean±SD) in the study group was 22.33±13.88 months.

Comparison of autonomic functions of pain patients with controls (Table II)

The pain patients showed a lower E:I ratio as compared to control group and this difference was found to be statistically significant (P=0.002). The study group also showed a lesser 30:15 ratio as compared to control group and this difference was found to be statistically significant (P=0.012). Both the SBP and the DBP were found to be significantly higher (P=0.00, P=0.003) in the study group as compared to the control group. However, the fall in the SBP and DBP in the study group was less as compared to the controls following change in posture. On performing sustained hand grip exercise both control group and study group showed a significant increase in SBP and DBP and the difference in the values of the average rise were not statistically significant between the 2 groups. In general the basal autonomic parameters show a decreased parasympathetic or an increased sympathetic tone in pain patients.

TABLE I: Basic parameters of the three groups studied. (n=30) in each group.

	Group C (Controls)	*Group A (Acupuncture)*	*Group B (Drug)*	*P value*
Age (years)	35.93±4.15	36.17±6.35	34.50±4.93	0.412
*Gender (female)	17 (56.7%)	16 (53.3%)	24 (80.%)	0.065
Weight (kg)	59.07±6.94	57.10±8.81	57.20±10.76	0.635
BMI	23.32±2.13	22.90±2.89	21.95±1.99	0.077
Basal heart rate (bpm)	74.15±8.03	71.15±6.98	72.54±9.04	0.600

Values expressed are mean±SD and P value is by one-way ANOVA. *Gender is expressed as the total number and percentage of females in the groups, P value is by Chi-square test).

TABLE II: Autonomic functions in pain patients (Groups A+B) and controls (Group C); in pain patients before (Group A1) and after (Group A2) acupuncture therapy & in pain patients before (Group B1) and after (Group B2) drug therapy (Values expressed ar mean±SD, n=30 in each group).

Autonomic function test	*Group C*	*Groups A+B*	*Group A1*	*Group A2*	*Group B1*	*Group B2*
E : I ratio	1.44±0.15	1.33±0.14**	1.32±0.13	1.30±0.13	1.36±0.15	1.30±0.13*
30 : 15 ratio	1.25±0.16	1.17±0.08**	1.18±0.09	1.13±0.70**	1.16±0.07	1.13±0.06
Resting BP (mm Hg)						
SBP	103.80±8.02	111.90±8.23***	111.27±6.42	110.33±5.97	112.53±9.78	111.73±7.60
DBP	71.0±8.33	77.07±9.03***	77.87±8.66	76.00±8.69	76.27±9.46	74.07±9.09*
PCT BP change (mm Hg)						
SBP	–1.87±6.12	–1.47±5.39	–2.40±6.04	–4.48±7.04	–0.53±4.55	–1.93±5.88
DBP	0.87±3.85	0.10±4.06	0.07±4.15	0.87±4.72	0.27±4.03	2.13±4.07
SHT BP change (mm Hg)						
SBP	19.67±5.68	18.53±2.20	17.87±9.16	19.33±4.08	19.80±7.19	19.87±5.70
DBP	19.07±6.47	18.40±6.04	18.20±5.10	19.40±4.17	18.60±6.93	19.40±6.41

*P<0.05, **P<0.01, ***P<0.001.
(PCT: Postural challenge test, SHT: Sustained handgrip test)

Comparison of autonomic functions and pain profile before (group A1) and after (group A2) acupuncture in pain patients (Table II, III)

Autonomic functions: The E: I ratio in study group A1 was 1.32±0.13 as compared to 1.30±0.13 in group A2. Even though ANOVA showed that it was statistically significant (P=0.007) but Tukey's test failed to show any significance. The post treatment group showed a decrease in 30:15 ratio which was found to be statistically significant (P=0.002). On standing, change in SBP and DBP was observed in both study groups but when analyzed individually the post treatment group showed more number of subjects showing a fall in SBP. During sustained hand grip test more number of subjects showed a rise in SBP and DBP during exercise but the change was not significant. Although statistically not significant, but comparison of autonomic function tests before and after electro acupuncture reveal reduction in sympathetic tone in a considerable number of pain patients.

Pain profile: Following acupuncture there was a reduction of 3.6±1.32 in VAS and 3.47±8.6 improvement in GPE scores indicating a considerable reduction in pain.

Comparison of autonomic functions and pain profile before (group B1) and after (group B2) drug therapy in pain patients (Table II, III)

Autonomic functions: The E:I ratio in group B1 was 1.36±0.15 as compared to 1.30±0.13 in group B2. The post treatment group showed a decrease in ratio and was found to be statistically significant (P<0.05). The 30:15 ratio showed a decrease after treatment but even though ANOVA showed statistical significance (P=0.002), the Tukey's test failed to show any significance. With change of posture, change in both SBP and DBP were observed. Following sustained hand grip exercise more number of subjects after treatment showed a rise in SBP and DBP but the change was not significant. The readings reveal a similar trend of changes in autonomic parameters as seen following electro acupuncture.

Pain profile: Following drug therapy there was a reduction in VAS of 2.73±1.63 and an improvement of 3.30±0.92 in GPE scores, indicating a reduction in pain.

Comparison of the effectiveness of acupuncture (group A2) and drug therapy (group B2) in pain patients (Table II, IV)

Autonomic functions: Both groups showed comparable values of E:I ratio and 30:15 ratio. On standing during the postural challenge test more number of subjects in the acupuncture group showed a fall in SBP

TABLE III: Pain profile of patients before and after acupuncture (Group A1, A2) and drug therapy (Group B1, B2) (Values expressed are mean±SD, n=30 in each group).

Scoring	*Group A1*	*Group A2*	*Group B1*	*Group B2*
VAS	6.80±1.33	3.30±1.58	6.90±1.45	4.20±1.80
GPE	2.03±0.65	5.50±0.68	2.00±0.45	5.30±0.74

TABLE IV: Comparison of pain profile in patients following acupuncture (Group A) and drug therapy (Group B).

Group (n=30)	*Change in VAS % ±SD*	*Change in GPE mean±SD*
A	52.69±17.96	3.47±0.86
B	39.05±20.80**	3.30±0.92

**P<0.01

as compared to the drug group. With sustained hand grip test both the groups showed a rise in SBP and DBP but these changes were comparable in both groups.

Pain profile: The average reduction in VAS pain scores was 52.69±17.96% in the group receiving acupuncture and was 39.05±20.80% in the group receiving drug therapy. The difference in response between the two groups was found to be statistically significant (P=0.009). There was no statistical difference in the GPE score between the two groups.

DISCUSSION

Pain is a syndrome characterized by changes in sensory-discriminative, affective and emotional-behavioral components. For this to be true, pain pathways must interact with other sensory modalities, with the autonomic nervous system, with the limbic system and also with cortical areas including those involved in higher functions.

Several studies have shown the involvement of autonomic nervous system in chronic pain but little information is available regarding the autonomic alterations in chronic LBP. The present study was carried out to find the effect or correlation of chronic LBP on autonomic status. It was observed that in the study group the E: I ratio and 30:15 ratio was low which suggests either a low vagal tone or it may also be due to an increased sympathetic outflow in the pain patients. A lower vagal tone has also been reported in a few other painful clinical conditions like multiple sclerosis (11) and in rheumatoid arthritis (12). Heart rate variability and blood pressure changes suggestive of altered autonomic nervous system response were also observed in men with chronic pelvic pain syndrome (13), while Shechter et al (14) observed a significantly lower R-R variation in cases of migraine as compared to controls.

Systolic and diastolic blood pressure recorded in the control and study groups showed individual variation in absolute values. However, on the whole, a comparison of the resting SBP and DBP between the control and study groups revealed a higher range of SBP and DBP in the study group. A similar trend of an increased basal blood pressure in pain patients has been reported. Ghione et at (15) in their experimental model of hypertension associated hyperalgesia in animals and humans has proposed that pain results in an increased blood pressure and Leden et al (16) also found an increased resting systolic and diastolic blood pressure in rheumatoid arthritis patients. The change in posture from lying to standing serves as an important function test to evaluate the baroreceptor reflex mechanism. In the present study, with change in posture, a lesser fall in SBP and DBP was observed in the pain group as compared to controls. In general the change was within the expected normal range as no subject showed a fall of more than 20 mmHg. More than 50% of the patients in the study group showed no change in SBP, with change in posture, in comparison to 30% of controls. Similarly 70% of pain patients in comparison to 53% of controls showed a rise in DBP on standing. All these findings suggest an elevated sympathetic activity in pain patients. A similar higher sympathetic tone in pain

patients has been reported in the literature. Perry et al (17) found a relative sympathetic dominance and a decrease in tonic parasympathetic cardiovascular activity in patients with arthritis and myofascial pain, while Collins et al (18) found a significant higher skin conductance in chronic LBP patients demonstrating an increased sympathetic sudomotor activity. Burton et al (19) in a study on the effects of deep and superficial experimentally induced acute pain in awake human subjects concluded that both acute muscle and skin pain cause an increase in skin sympathetic nerve activity, sweat release and changes in skin blood flow. An increase in both SBP and DBP was observed during sustained handgrip in both controls and patients. The values for controls are comparable with reported figures. However, no significant difference was seen between the study groups and controls.

The nociceptive and autonomic nervous systems are two components of an integrated central network which is critical for adaptation and survival in response to internal or external challenges. Nociceptive and autonomic regulatory regions of the CNS often respond to the same type of somatic or visceral inputs, receive convergent nociceptive and viscerosensory information and contain groups of neurons that initiate autonomic, antinociceptive and behavioral response to noxious and visceral stimuli. These regions maintain a continuous level of activity of the cardiovascular effectors, to prevent wide variations of blood pressure, by initiating integrated adaptive cardiovascular responses to external stimuli or during different behaviors (20).

Following electro acupuncture more than 50-60% of patients had a decrease in their E:I and 30:15 ratios. This indicates a significant reduction in the vagal tone. Not many studies are available where the standard autonomic function tests have been evaluated before and after acupuncture, though, there are some studies where single parameters have been evaluated. Haker et al (21), however, found a significant increase in the sympathetic and parasympathetic activity during sensory stimulation (acupuncture) and in the post stimulation period depending upon the site of stimulation (ear, thenar muscles) in healthy subjects.

In a number of patients in this study the basal DBP was seen to be lower after acupuncture indicating a trend of lowered sympathetic tone in this post treatment group. With change in posture the SBP decreased in a majority of patients also indicating a decrease in sympathetic activity but, the DBP did not show any change. Experimental studies from our lab have reported a depressor blood pressure response following acupuncture-like stimulation and hence a change in autonomic balance towards increased parasympathetic and/or decreased sympathetic activity (22). The average change in SBP and DBP in response to sustained handgrip did not show any significant difference between pre and post treatment group. More than 80% of total subjects (both groups) showed an increase in both SBP and DBP during handgrip test. Following electro acupuncture no significant change in blood pressure was found with handgrip. Middlekauff et al (23) reported that acupuncture does not attenuate the blood pressure or heart rate response during handgrip exercise or the cold pressor test in healthy subjects.

In animal experiments electro acupuncture has been shown to improve imbalance of autonomic function, by stimulating parasympathetic activity and inhibiting sympathetic activity, in conscious rats under restraint stress (24). In another study, on anaesthetized cats, electro acupuncture was shown to affect haemodynamics through modulation of efferent sympathetic nerve activity (25).

A decrease in E: I and 30:15 ratios was observed among post drug group as compared to pre drug group, suggesting a significant decrease in vagal tone. Basal sympathetic tone was found to be higher in pre drug group as compared to post drug group. With change in posture more number of patients showed a fall in SBP and a lesser number showed no change after drug therapy. This suggests a reduction in the sympathetic tone in a few patients. The average change in SBP and DBP in response to sustained handgrip did not show any significant difference between pre and post treatment group. More than 90% of total patients (both groups) showed an increase in both SBP and DBP during sustained handgrip test. Few studies have been reported where autonomic functions were evaluated after drug therapy. One study reports a significant increase in R-R intervals in hyperthyroid patients after pharmacological treatment (26).

In the present study, when compared, no significant difference was found between post treatment acupuncture group and post treatment drug group in tests for E:I ratio and 30:15 ratio. Sustained handgrip test did not show any difference between the two groups. More than 90% of the total subjects in both groups showed an increase in both SBP and DBP during handgrip. However, blood pressure response to change in posture revealed more number of patients after acupuncture showing a fall in SBP as compared to patients after drug therapy, suggesting a decreased sympathetic activity in the after acupuncture group.

A significantly greater pain relief was reported in response to acupuncture therapy in pain patients as compared to a mild pain relief observed in the drug group. In a randomized trial comparing acupuncture, simulated acupuncture and usual care for chronic LBP, acupuncture was found effective in these patients (27). Based on published evidence, acupuncture is most likely to benefit patients with LBP, neck pain, chronic idiopathic or tension headache, migraine and knee osteoarthritis (28). Carlsson et al (7) in their study also found that acupuncture may have a superior long term effect on chronic LBP as compared to a placebo. However, Van Tulder et al (29) studied the effectiveness of acupuncture in the management of LBP in 11 randomized controlled trials and observed that there was no evidence showing acupuncture is more effective than placebo or sham acupuncture. Leibing et al (30) also studied the efficacy of acupuncture in 131 subjects who were randomly assigned to one of the 3 treatment group: traditional acupuncture, sham acupuncture and physiotherapy. They found a significant improvement in chronic LBP by acupuncture treatment as compared to physiotherapy but not as compared to sham acupuncture.

In a comparative study of the analgesic effects of electro acupuncture, morphine, clonidine and a combination of the above,

conducted in our lab by Shankar et al (31), it was found that a combination of electro acupuncture and morphine was the most effective, thereby suggesting, that electro acupuncture can be used together with the conventional analgesic therapy for better response. A similar finding was reported by Molsberger et al (32) when, on comparing acupuncture with conventional therapy, they found a significant decrease in pain intensity and longer therapeutic pain relief with a combination of acupuncture and conventional therapy. They concluded that acupuncture can be used as an important supplement of conservative orthopedic treatment in the management of chronic LBP.

Conclusion

This study has shown an altered autonomic status in chronic LBP patients, revealing a reduced vagal tone and an increased sympathetic tone. Following electro acupuncture and drug therapy, there was a significant pain relief in these patients accompanied by a significant reduction in vagal tone and a decrease in the sympathetic tone. Thus a suggestion from our study, which needs to be further explored, is the association between alterations in autonomic status and relief of pain in patients with painful conditions.

It was also observed that subjects in the acupuncture group showed a better response as compared to the drug group, and therefore acupuncture can be considered as an alternative/additive treatment for chronic LBP.

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