THE EFFICACY OF ORAL ALPHA-LIPOIC ACID FOR PHYSIOTHERAPY SUPPLEMENTATION IN THE TREATMENT OF SCIATIC NEUROPATHIC PAIN

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ABSTRACT

Background: One of the major health problems among workers is musculoskeletal disorders such as lower back pain, joint and muscle problems. This problem affects quality of life, physical and psychosocial activities, performance at work and everyday-life activities. Although, neuropathic pain is the most common symptom found in patients with nervous system disorder, there is little information available on neuropathic element to LBP. Alpha-lipoic acid improve peripheral neurological problems is well known many studies in the past use ALA to prevent peripheral nervous system, especially polyneuropathies in diabetic patients. ALA may also help peripheral neuropathy caused by back problems and improve their quality of life

Study Design: A randomized, double-blinded, placebo-controlled trial.

Objective: To study the efficacy of oral alpha-lipoic acid supplement to physiotherapy in the treatment of sciatic neuropathy caused by back pain problems and also in quality of life.

Method: 34 Thai patients with sciatic neuropathic pain received physical therapy twice times per week and once-daily oral dose of ALA 600 mg (n=15) or physical therapy alone (n=15) for 4 weeks. 4 of them dropped out because their personal reasosn. The primary outcome measures were the mean differences of modified NPS and NePIQoL questionnaire.

Result: The modified NPS score in part of total pain scale, sharp pain and intense deep pain characteristic of patients who received 600 mg oral ALA supplementation physical therapy treatment have significantly improved mean from the first week earlier than patients who received physical therapy alone (NPS; pain_wk2= 4.06±1.98, *p-value* < 0.001, sharp pain_wk2= 2.47±2.10, *p-value* < 0.05, intense deep pain_wk1 = 4.40±2.03, *p-value* < 0.001). The NePIQol score in part of the effects on patient's health of patients who were in experiment group has also significantly mean improved from the first week earlier than patients who received physical therapy alone (NePIQol, the effects on patient's health_wk4 = 0.93±1.91, *p-value* < 0.05,)

Conclusion: we suggest that this treatment program, ALA supplementation in the treatment of physical therapy may help decrease pain, sharp pain and intense deep pain earlier than physical therapy alone, and thus results in patient's better quality of life. Nevertheless, using oral ALA 600 mg for long term it cannot be help.

Keywords: neuropathic pain, sciatic nerve, Alpha-Lipoic acid, Physical therapy,

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Neuropathic pain syndrome is the result of nervous system from chronic noxious stimuli. It comes from central or peripheral nerve or both. After primary problems such as infection, metabolic abnormality (ie. diabetes), musculoskeletal problems lead to neuropathic pain (Dworkin et al., 2003).

One of the major health problems among workers is musculoskeletal disorders such as lower back pain (LBP), (.Kaki, El-Yaski, 2005, Dworkin et al, 2003) Sciatic neuropathic pain is the most common symptom that be found after nerve damage. This problem affects quality of life, physical and psychosocial activities, performance at work and everyday-life activities (Dworkin et al., 2003). Alpha-lipoic acid (ALA) is well known in the treatment of diabetic peripheral neuropathy (DPN)(Catherine 2010). Also many studies in the past use ALA to prevent central and peripheral nervous system, especially in DPN patients. (Ziegler D. et al. 2008) The results are impressed. But there is no study of the neuropathic pain related to musculoskeletal problems. Its anti-oxidant (Packer et al, 1995) and neuroprotective effect (Ametov et al, 2003) may also help neuropathic pain, come from back problem. There are two aim of the study. The first aim is study the efficacy of oral alpha-lipoic acid supplement to physiotherapy in the treatment of sciatic neuropathy in lower back pain. And second is study the efficacy of oral alpha-lipoic acid supplement to physiotherapy in quality of life in sciatic neuropathic pain.

Research design and methods

A randomized, double-blind, placebo controlled trial study. 34 Thai patients with a diagnosis of sciatic neuropathic pain who wanted to receive the treatment in PK physiotherapy clinic and Mae Fah Luang hospital were randomized to two groups. Experiment group received oral ALA 600 mg per day. And control group received placebo, Maltodexirin, same size same and same dose. Every patient received the physiotherapy treatment twice a week, 4 weeks. Physical therapy program included mobilization technique use for their joint stiffness, ultrasound use for their inflammations and adhesion area, traction use for improve lumbar spine circulation, lumbar stabilization exercises and ergonomic educations**.**

Inclusion criteria at the screening visit were participants any genders with sciatic neuropathic pain caused by back problems, i.e.herniated disc, lumbar spinal stenosis, and back dysfunction, radiculopathy, aged between 22-60 years. Participants would be fulfilled one of the following criteria; pain and abnormal sensory symptoms in association with either absence of normal sensation, the presence of normally heightened sensation or pain, abnormal sensory symptoms in association with neurological signs indicative of motor or autonomic dysfunction. Exclusion criteria, participants who had muscle weakness grade 0, I, II, severe disc extrusion patients, other severe neurological deficits such as spinal bifida, pregnant and breastfeeding women, participants who took supplement known to alter neuropathy such as vitamin B within two weeks before this study program, patients who had extreme condition which need to be cured in hospital, Diabetes, multiple sclerosis, patients who were diagnosed cancer and alcoholic

Outcome measurement

There are two measurements in the study. Modified the Neuropathic Pain Scale (NPS), it was modified from the Neuropathic Pain Scale (NPS) (Fishbain et al, 2008) for more exquisite and suitable with patients. Consist of pain sharpness, heat/cold, dullness, intensity, overall unpleasantness, surface and deep pain. The researcher interviewed patients. Each question there are 10 scale, modified from comparative pain scale (Harich 2002)**.** And Modified Neuropathic Pain Impact on Quality-of-Life Questionnaire (NePIQoL), (Poole et al, 2009) a measure to assess quality of life in neuropathic pain. NePIQoL is an acceptable, patient-derived, neuropathic pain specific measure with evidence of reliability, validity, and temporal stability. There are 7 category questions, symptoms, relationships, psychological, social activity, physical change, personal care, overall health and overall quality of life.

Ethic considerations

This study has been approved by Ma Fah Loung ethic committee, approval number 55/2554. That this is human experiment study of two groups; experiment group taking ALA and control group taking placebo that had not show side effect.

Statistical analysis

Data analysis was based on KS statistic test to evaluate distribution of data. All of data shows normal distribution. Independent t-test was used to compare post treatment symptom between experiment and control group, *p* value less than 0.05. Paired t-test was used to compare before and after, in both groups.

Results

37 participated in the study. 34 Thai, participants were included, 4 of them were dropped out of this study. Their reason was personal reasons. There were 30 participants finished the study and 4 dropped out participants, accounting for 11.76%. 25%of dropped out participants were due to inconvenience to travel, 25% did not continue the treatment and 50% taking natural pain killer drug for relive their fever. There was not any participant had sign of ALA side effect.

After finished the study, there is no significant mean difference of modified NPS score and NePIQoL questionnaire, compared experiment and control group. Nevertheless, all categories of modified NPS score and NePIQol score have significant improved from the first visit after treatment program, except NPS; burning sensation, intense surface pain.

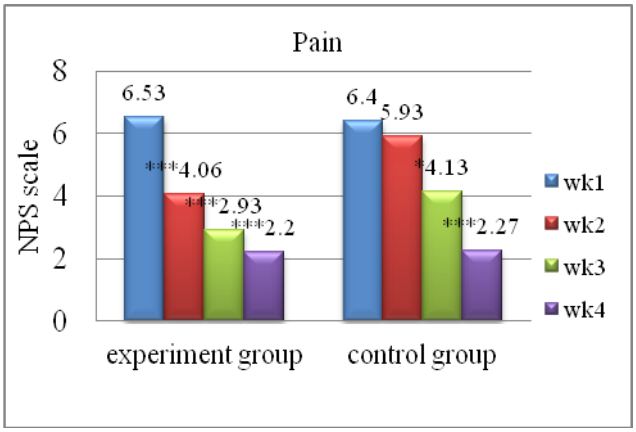

Figure 1 shows mean significant difference of pain scale after treatment in experiment and control group.**p-value*<0.05, .****p-value*<0.001

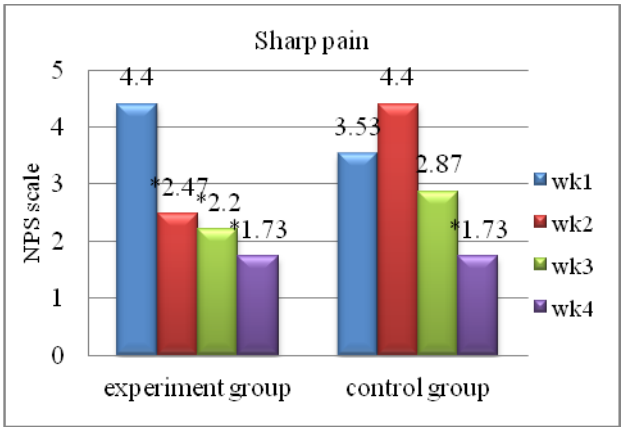

Figure 2 shows mean significant difference of sharp pain scale after treatment in experiment and control group.**p-value*<0.05

And pain significant reduction after treatment program in experiment group approximately one week earlier than control group. The modified NPS score in part of total pain scale, sharp pain and intense deep pain characteristic of patients who received 600 mg oral ALA supplementation physical therapy treatment has significantly improved mean from the first week earlier than patients who received physical therapy alone (Pain 4.06±1.9, *p-value*≤ 0.001, Sharp pain mean 2.47±2.10, *p-value*≤ 0.05, intense deep pain 4.40±2.03, *p-value*≤ 0.001).Also NePIQol score in personal care category, the significant shows in the last week (0.93±1.91, *p-value*≤ 0.05) for experiment group. But the significant improvement has not seen in control group.

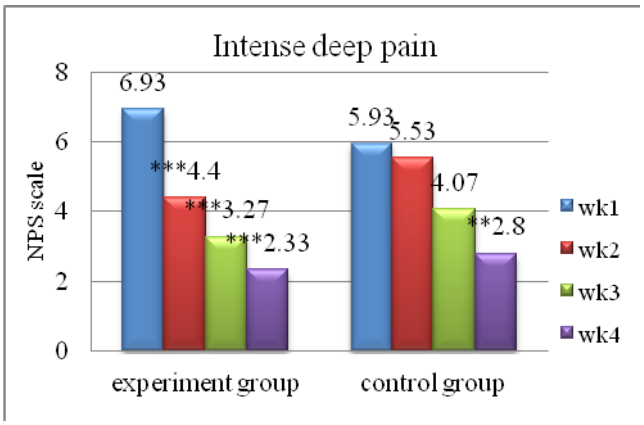

Figure 3 shows mean significant difference of intense deep pain scale after treatment in experiment and control group.***p-value*<0.01, .****p-value*<0.001

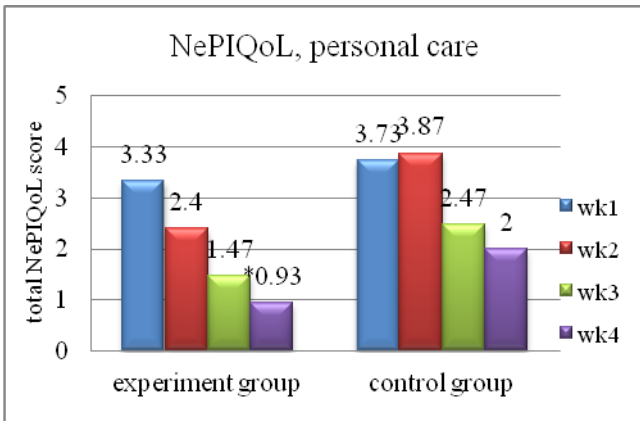

Figure 4 shows mean significant difference of NePIQoL; personal care score after treatment in experiment and control group.**p-value*<0.05,

Discussion

The modified NPS score in part of total pain scale, sharp pain and intense deep pain characteristic of patients who received 600 mg oral ALA supplementation physical therapy has significantly improved mean from the first week earlier than patients who received physical therapy alone. Same as previous studied (Ziegler, et al. 2006), oral ALA treatment in diabetic peripheral neuropathy (DNP), their results found a significant reduction of Neuropathy Symptoms and Change score (NSC) and Total Symptom score (TSS) was observed in all active arms compared with the placebo arm (all $P \leq 0.05$) but no significant differences among the three ALA groups, 600, 1200 and 1800 mg and the placebo group were noted for paresthesia and numbness. In contrast burning pain, intense surface pain from this study, the significant different are not found.

Previous review, ALA treatment for neuropathic pain in DNP (Mijnhout .G.S, et al. 2010),they found 4 RCTs had a significant improve, an oral or intra venous ALA dose at list 600 mg per day resulted in 50% reduction in TSS but in most group was less than 30%. In their discussion, the improvements of oral ALA were much less clearly described. So they did not recommend the use of oral ALA for the treatment of diabetic neuropathy. Dissimilarly, from this study more than 60% reduction in the last week are found such as pain scale reduction is 55.30% in the 3rd and 66.36 % in the last week, sharp pain reduction is 50% in the 3rd and 60.61% in the last week, intense deep pain reduction is 52.81% and 66.38%.

Therefore we are confirming oral ALA 600 mg supplementation in the treatment of physical therapy can earlier decrease neuropathic pain symptom; sharp pain, and intense deep pain and also improve quality of life in sciatic neuropathic pain which is approximately two or three weeks earlier than the control group who experienced the improvement in the last week. The mechanism may because its antioxidant effect (Catherine 2010, Packer et al, 1995, Packer et al, 2001). After peripheral nerve damage, inflammatory responded (Boohassira et al, 2005, Dworkin et al,2003 ,Harich et al, 2002) That lead to oxidative stress. ALA may help in that part.

Conclusion and comment

This study is the first study of ALA supplementation physiotherapy in the treatment of sciatic nerve neuropathic pain that come from back problems. More studies shall be conducted in order to prove and strengthen the results and findings from this study. Future studies, more populations. for oral ALA over dose should be careful from previous study(Ziegler, et al. 2006). Overdosing can make participants have nausea and vomiting.

However the results from the study are much value to the patients who suffer from neuropathic pain

Reference

Ametov, A. S., Barinov, A., Dyck, P. J., Hermann, R., Kozlova, N., Litchy, W. J., Low, P. A., Nehrdich, D., Novosadova, M., O'Brien, P. C., Reljanovic, M., Samigullin, R., Schuette, K., Strokov, I., Tritschler, H. J., Wessel, K., Yakhno, N. & Ziegler, D. (2003). The sensory symptoms of diabetic polyneuropathy are improved with alpha-lipoic acid. **Diabetes Care, 26**(3), 770-776.

Bouhassira, D., Attal, N., Alchaar, H., Boureau, F., Brochet, B., Bruxelle, J., Cunin, G., Fermanian, J., Ginies, P., Grun-Overdyking, A., Jafari-Schluep, H., Lantéri-Minet, M., Laurent, B., Mick, G., Serrie, A., Valade, D. & Vicaut, E. (2005). Comparison of pain syndromes associated with nervous or somatic lesions and development of a new neuropathic pain diagnostic questionnaire (DN4). **Pain, 114**(1-2), 29-36.

Catherine, U. P. (2010). **Natural standard herb and supplement guide: An evidence-based refference**. Missouri: Mosby Elsevier.

Dworkin, R. H., Backonja, M., Rowbotham, M. C., Allen, R. R., Argoff, C. R., Bennett, G. J., Bushnell, M. C., Farrar, J. T., Galer, B. S., Haythornthwaite, J. A., Hewitt, D. J., Loeser, J. D., Max, M. B., Saltarelli, M., Schmader, K. E., Stein, C., Thompson, D., Turk, D. C., Wallace, M. S., Watkins, L. R. & Weinstein, S. M. (2003). Advances in neuropathic pain: Diagnosis, mechanisms, and treatment recommendations. **Arch Neurol, 60**(11), 1524-1534.

Fishbain, D. A., Lewis, J. E., Cutler, R., Cole, B., Rosomoff, H. L. & Rosomoff, R. S. (2008). Can the neuropathic pain scale discriminate between non-neuropathic and neuropathic pain?. **Pain Medicien, 9**(2), 149-159.

Harich, J. (2002). The comparative pain scale. Retrived Month Day Year, from http://www.tipna.org/info/documents/ComparativePainScale.htm.

Helms, J. E. & Barone, C. P. (2008). Physiology and treatment of pain. **Crit Care Nurse, 28**(6), 38-49.

Kaki, A. M., El-Yaski, A. Z., Youseif, E. (2005). Identifying neuropathic pain among patients with chronic low-back pain: Use of the leeds assessment of neuropathic symptoms and signs pain scale. **Regional Anesthesia and Pain Medicine, 30**(5), 422.e1-422.e9

Mijnhout, G. S., Alkhalaf, A., Kleefstra, N. & Bilo, H. J. (2010). Alpha lipoic acid: A new treatment for neuropathic pain in patients with diabetes?. **Netherland the Journal of Medicine, 68**(4), 158-162.

Packer, L., Witt, E. H. & Tritschler, H. J. (1995). Alpha-lipoic acid as a biological antioxidant. **Free Radical Biology & Medicine, 19**(2), 227-250.

Packer, L., Kraemer, K. & Rimbach, G. (2001). Molecular aspects of lipoic acid in the prevention of diabetes complications. **Nutrition, 17**(10), 888-895.

Poole, H. M., Murphy, P. & Nurmikko, T. J. (2009). Development and preliminary validation of the NePIQoL: A quality-of-life measure for neuropathic pain. **Journal of Pain and Symptom Management, 37**(2), 233-245.

Ziegler, D., Ametov, A., Barinov, A., Dyck, P. J., Gurieva,I., Low, P. A., Munzel, U., Yakhno, N., Raz, I., Novosadova, M., Maus, J. & Samigullin, R. (2006). Oral treatment with alpha-lipoic acid improves symptomatic diabetic polyneuropathy: The Sydney 2 trial. **Diabetes Care, 29**(11), 2365-2370.

Ziegler, D. (2008). Treatment of diabetic neuropathy and neuropathic pain. **Diabetes Care, 31**(Suppl. 2), S255-S261.