

Quantification of Acupuncture Effects on Peripheral Neuropathy of Unknown and Diabetic Cause by Nerve Conduction Studies

Sven Schroeder^{1,2,6}, Andrew Remppis^{2,4,6}, Tobias Greten⁶, Frank Brazkiewicz^{2,3,6}, Michael Morcos⁷, Henry Johannes Greten^{2,5,6}

1 Hamburg Center of Traditional Chinese Medicine, Germany

2 Heidelberg School of Chinese Medicine, Germany

3 Bremen Institute of Traditional Chinese Medicine, Germany

4 Dpt. of Internal Medicine III, University Hospital of Heidelberg, Germany

5 Instituto di Ciencias Biomedicas Abel Salazar, University of Porto, Department of Neurophysiology, Portugal

6 German Society for TCM, Germany

7 Dpt. of Internal Medicine I, University Hospital of Heidelberg, Germany

【摘要】目的：通过神经传导改变的测量评估针灸对于周围神经病变的疗效。**方法：**评估 192 例周围神经病变患者一年以上。17 例为糖尿病神经病变，其中 3 例根据海德堡中医规范定义接受传统中医的针灸治疗，所有神经传导检测均得到改善。14 例非特异性治疗的患者，3 例（21.4%）患者神经传导检测显示改善，其余 11 例（78.6%）患者神经传导检测显示恶化。全部 47 例患者符合周围神经病变不明确病因学的标准，21 例患者接受针灸治疗，26 例患者接受非特异性治疗。所有组别均在治疗前和 4 月后进行神经传导检测。**结果：**1) 糖尿病神经病变，对照组中 3 例患者得到改善，11 例显示恶化，组间比较有显著差异。2) 周围神经病变，针灸组中 16 例患者（76.2%）得到改善，而在对照组中只有 4 例（15.4%）得到改善。针灸组中 3 例患者（14.3%）显示无变化，2 例（9.5%）显示恶化。但是对照组中 7 例（26.9%）无变化，并有 15 例（57.7%）显示恶化。具有显著差异。**结论：**根据神经传导检测，针灸治疗周围神经病变具有积极的疗效。

【关键词】 针刺疗法；糖尿病神经病变；神经传导

【Abstract】Objective: To evaluate the effect of acupuncture on peripheral neuropathy (PN) as measured by changes in nerve conduction studies (NCS). **Methods:** 192 patients with PN were evaluated over a period of 1 year. In 17 patients diabetic neuropathy was found. 3 of these patients received acupuncture therapy according to classical Chinese medicine as defined by the Heidelberg model of TCM and all improved in NCS. Of the 14 non-specifically treated patients, 3 (21.4%) presented with improved NCS and 11 (78.6%) aggravated in NCS ($P<0.03$). An overall of 47 patients met the criteria for PN of undefined aetiology, 21 patients received acupuncture therapy, while 26 patients received no specific treatment. All groups were examined by NCS before treatment and 4 months later. **Results:** 1) Diabetic neuropathy, in the control-group 3 patients improved and 11 showed an aggravation. Comparison of groups was significantly different. 2) PN, 16 patients (76.2%) in the acupuncture group improved, while only 4 patients in the control group (15.4%) did so. 3 patients in the acupuncture group (14.3%) showed no change and 2 patients an aggravation (9.5%), whereas in the control group 7 patients showed no change (26.9%) and 15 an aggravation (57.7%). Comparison of the groups was significantly different. **Conclusion:** There is a positive effect of acupuncture on PN, as measured by objective parameters (NCS).

【Key Words】 Acupuncture Therapy; Diabetic Neuropathies; Nerve Conduction

【CLC Number】 R246.1

【Document Code】 A

Author: Sven Schroeder, Dr. med, University of Hamburg, Germany, engage in application of Heidelberg Model in Neuropathies

The aetiology of peripheral neuropathy (PN) often remains elusive resulting in a lack of objective therapeutic strategies. But even with diabetes mellitus as the known cause, disease will progress in spite of optimal anti-diabetic treatment. The author conducted a pilot study to evaluate the therapeutic effect of acupuncture on PN as measured by changes in nerve conduction.

1 Material and Methods

One hundred and ninety-two patients with PN as diagnosed by nerve neurological examination and positive conduction studies (NCS) were evaluated over a period of 1 year. Patients with alcohol abuse, drug usage, toxic medical drugs, suspected neoplasms or inflammatory disease were documented as underlying causes for PN were excluded from the study. This was confirmed by a wide diagnostic laboratory screening, general physical examination, urological or gynaecological examination. In 17 cases diabetes mellitus was detected as the cause of the disease diagnosed by fasting blood glucose and HbA1c. Three of these patients received acupuncture, 14 no specific treatment. An overall of 47 patients met the criteria for PN of undefined aetiology. 21 patients received acupuncture therapy according to classical Chinese medicine as defined by the Heidelberg Model [1], while 26 patients received best medical care but no specific treatment for PN. NCS was determined before treatment and after 4 months. Statistical analyses were performed using the unpaired *t*-test (values are given as $\bar{x} \pm s$), the Chi-squared analysis and the Fisher exact test. Significance was accepted at the $P < 0.05$ level.

2 Results

2.1 PN of unknown cause

Sixteen patients (76.2%) in the acupuncture group improved as measured by NCS, while only 4 patients in the control group (15.4%) did so. 3 patients in the acupuncture group (14.3%) showed no change and 2 patients showed aggravation (9.5%), whereas in the control group, 7 showed no change (26.9%) and 15 an aggravation (57.7%) (Chi-square = 17.646, $df = 2$, $P < 0.001$). The individual change of the amplitude of the sural nerve showed an average improvement in the acupuncture-treated group of $(1.5 \pm 1.43) \mu V$ and an average aggravation of $(0.5 \pm 2.10) \mu V$ in the

control-group. The statistical significant difference between both groups was $2 \mu V$ (unpaired *t*-test, $t=3.721$, $df=45$, $P=0.001$). The sensible nerve conduction of the sural nerve showed an average improvement in the acupuncture-treated group of $(8.98 \pm 16.37) m/s$ and an average aggravation in the control-group of $(1.23 \pm 6.53) m/s$. The difference in these group was $10.21 m/s$, and was statistically significant (unpaired *t*-test, $t=2.912$, $df=45$, $P=0.006$). Analyses of individual change of motor amplitude of the tibial nerve in all motor involved patients (acupuncture-group $n=14$, control-group $n=10$) revealed a mean improvement in the acupuncture-group of $(2.07 \pm 2.56) mV$ while controls experienced a mean aggravation of $(1.00 \pm 2.05) mV$, representing a significant difference of $3.07 mV$ ($t=3.132$, $df=22$, $P < 0.005$). Comparing the individual changes of the tibial nerve conduction velocities, there was a mean amelioration in the acupuncture-group of $(1.39 \pm 4.36) m/s$ and of $(0.85 \pm 1.83) m/s$ in the control group, resulting in a mean non-significant difference between groups of $0.44 m/s$ ($t=0.369$, $df=22$, $P=0.717$).

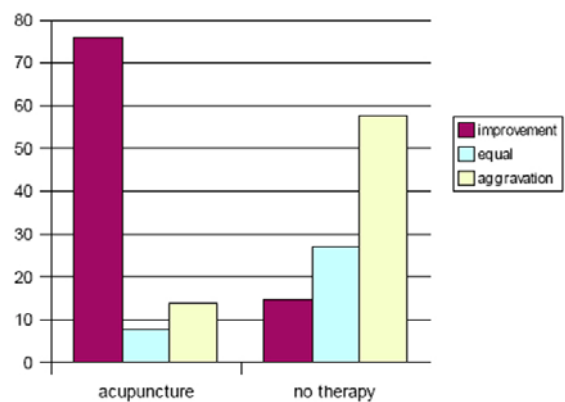


Fig.1. Neuropathy of unknown cause (assessed by NCS %)

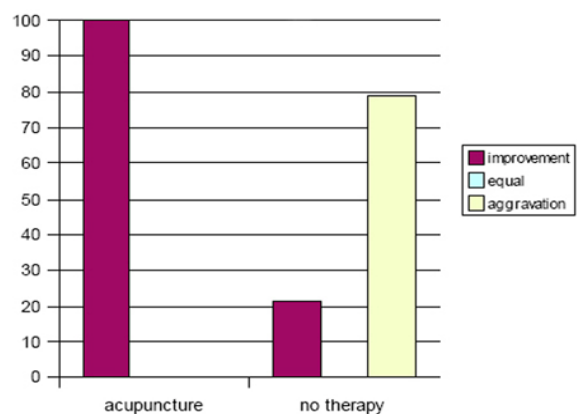


Fig.2. Diabetic neuropathy (assessed by NCS %)

2.2 Diabetic Neuropathy

In all 3 acupuncture-treated patients, an improvement of NCS was detected. In the control-group, 3 (21.4%) patients improved and 11 (78.6%) showed an aggravation. Comparison of groups was significantly different ($P=0.029$, Fisher-exact test). The individual change of the amplitude of the sural nerve showed an average improvement in the acupuncture-treated group of (1.17 ± 0.76) μV and an average improve of (0.11 ± 0.74) μV in the control-group. The statistical significant difference between both groups was 1.06 μV and statistically different (unpaired t -test, $t=2.248$, $df=15$, $P=0.040$). The sensible nerve conduction of the sural nerve showed an average improvement in the acupuncture- treated group of (3.33 ± 5.77) m/s and an average aggravation in the control-group of (0.50 ± 1.93) m/s. The difference in these group was 3.83 m/s, and was statistically significant (unpaired t -test, $t=2.175$, $df=15$, $P=0.046$). Analysis of individual change of motor amplitude of the tibial nerve revealed a mean improvement in the acupuncture-group of (2.50 ± 2.00) mV while controls experienced a mean of (0.00 ± 1.36) mV, representing a significant difference of 2.50 mV (unpaired t -test, $t=2.690$, $df=15$, $P=0.017$). Comparing the individual changes of the tibial nerve conduction velocities, there was a mean amelioration in the acupuncture-group of (1.00 ± 1.73) m/s and an aggravation of (0.50 ± 3.20) m/s in the control group, resulting in a mean non-significant difference between groups of 1.50 m/s (unpaired t -test, $t = 0.775$, $df = 15$, $P = 0.451$).

3 Discussion

Altered nerve conduction velocity in PN is considered to reflect structural damage of myelin sheaths, while the amplitude correlates with the

number of functional axons^[2]. The data suggest that acupuncture induces amelioration of both myelin sheath and axon function. It has been shown by Litscher et al^[3] that acupuncture may increase blood flow in the limbs. Increased blood flow to the vasa nervorum and dependant capillary beds supplying the neurons may potentially contribute to nerve repair with measurable improvement of axons or myelin sheaths after 10 treatments^[4,5]. This pilot-study shows encouraging results justifying a randomized, controlled trial as demanded by the NIH^[6] on the basis of NCS and the application of acupuncture. The data suggest that there is a positive effect of acupuncture on PN of undefined aetiology as well as diabetic neuropathy, as measured by objective parameters (NCS). This is of special clinical interest, as acupuncture may offer an effective treatment for an otherwise hard-to-treat disease with no side effects

References

- [1] Greten, HJ. *Kursbuch Traditionelle Chinesische Medizin*. 2nd Edition, Stuttgart-New York: Thieme Publishing House, 2005.
- [2] McLeod JG. Investigation of Peripheral Neuropathy. *J Neurol Neurosurg Psychiatry*, 1995, 58(3): 274-283.
- [3] Litscher G, Wang L, Huber E, et al. Changed Skin Blood Perfusion in the Fingertip Following Acupuncture Needle Introduction as Evaluated by Laser Doppler Perfusion Imaging. *Lasers Med Sci.*, 2002, 17(1): 19-25.
- [4] Diabetes Control and Complication Trial Group (DCCT). The Effect of Intense Treatment on the Development and Progression of Long-term Complication in Insulin-dependent Diabetes Mellitus. *New England Journal of Medicine*, 1993, 329(14): 977-986.
- [5] Sato A, Schmidt RF. Somatosympathetic Reflexes: Afferent Fibers, Central Pathways, Discharge Characteristics. *Physiol Rev.*, 1973, 53(4): 916-947.
- [6] Acupuncture. NIH Issues Consensus Statement, 1997, 15(5): 1-34.

Received Date: August 1, 2008

Celebrate the 3rd Workshop on Scientific Approaches to Chinese Medicine

The 3rd workshop on Scientific Approaches to Chinese Medicine is held by German-Chinese Research Foundation for Traditional Chinese Medicine (DCFG-TCM), it will draw more and more worldwide attention and make remarkable contributions to Traditional Chinese Medicine.

Journal of Acupuncture and Tuina Science (ISSN 1672-3597, CN 31-1908) wishes the workshop a complete success!

Welcome to the workshop! Welcome contribution!