Letters to the Editor

Acupuncture enhances superoxide dismutase (SOD) activity in the serum of rheumatoid arthritis patients

Sirs,

Acupuncture has been sought by patients with rheumatoid arthritis (RA) for symptomatic treatment (1, 2). However, the underlying mechanism responsible for the therapeutic effect of acupuncture is not well known. RA is a chronic autoimmune disease, principally characterized by synovial inflammation of the joints. In pathogenesis of RA, the formation of oxygen free radicals (OFRs) is an essential process (3, 4). Antioxidants such as superoxide dismutase (SOD) reduce the cell damage caused by OFR, and it is suggested that the increased antioxidant activity including SOD relieves the symptoms of RA (5). Therefore, we hypothesized that acupuncture might modulate oxidative stress by enhancing the activity of antioxidants in RA patients, and investigated whether acupuncture could affect the activities of antioxidants such as SOD, catalase and total antioxidant status (TAS) in the serum of RA patients. This is a follow-up analysis of the previously reported clinical study (1).

Since a formal ethics committee had not been established at our institution at the time of this study, we assessed the appropriateness of the protocol by consulting the senior members of the college staff, including medical doctors, a nurse and a priest. Twenty-five patients who met the American College of Rheumatology criteria for RA attended with informed consent. Among those patients, 23 completed 14 sessions of partially individualized acupuncture treatment for 6 weeks. A total of 21 patients were included in this study because two blood samples from two patients were not separated properly. Changes in the activities of SOD, catalase and TAS were assessed at baseline and after 6 weeks of treatment. For control purposes, previously reported swollen joint counts (1) were used as covariates.

After the acupuncture treatment, the activities of SOD and catalase significantly increased ($p<0.01$ and $p<0.05$, respectively), but there was no change in TAS. We further investigated whether the changes in swollen joint counts were correlated with the changes in SOD, catalase or TAS in the RA patients using Spearman correlation coefficients. Interestingly, the results showed that the decrease in the number of swollen joints was significantly correlated with the increased SOD activity (r=0.44, $p<0.05$), but not with the activity of catalase ($p=0.196$) or TAS ($p=0.288$). To observe the relationship between the changes in symptoms and SOD activity more clearly, we divided all of the participants into two groups: responders (at least 50% reduction in swollen joint counts) or non-responders (less than 50% reduction in swollen joint counts), and compared the changes in SOD, catalase and TAS between two groups. The responders showed significantly greater changes in the activity of SOD ($p<0.01$) than the non-responders, but there were no significant differences in the changes of the catalase activity and TAS between the groups (Table I). The sensitivity analysis indicated that the change of SOD was not influenced by medication.

These findings suggested that the acupuncture treatment induced the increased activities of SOD and catalase in the serum of RA patients and that the reduction in the number of swollen joints was significantly related to the upregulation of SOD activity. Although a variety of factors such as susceptibility genes, disease-causing immune cells, cytokine and signal transduction networks are involved in the pathogenesis of RA (6), our results could participate as valuable pieces in unscrambling the puzzle to the yet indistinct mechanism of acupuncture treatment in RA. Since this study has limitations in the small sample size and no control group, more rigorous studies with a placebo control group are warranted to confirm these findings. This study was supported by the AMMR Project of KIOM and the SRC program of KOSEF (R11-2005-014).

Table I. Baseline characteristics and the comparisons of SOD, catalase and TAS before and after 6 week acupuncture treatment (n=21).

Baseline	Week 6	*p*-value		Subgroup analysis		
				Subgroup*	Changes	*p*-value
Age-yrs	52.4 (7.6)					
BMI	22.0 (3.5)					
Female (%)	85.7 %					
Acupuncture naive (%)	28.6 %					
Medication (%)	Yes: 57.1 % No: 42.9 %					
Duration of disease-yrs	8.7 (7.9)					
Swollen joint count	4.5 (3.0)	1.0 (1.2)	<0.01	A	- 4.3 (2.6)	<0.01
				B	- 0.2 (0.4)	
SOD (U/ml)	1.8 (2.3)	4.1 (1.9)	<0.01	A	2.8 (2.4)	<0.01
				B	0.3 (0.6)	
Catalase (U/ml)	60.2 (9.0)	64.3 (11.7)	<0.05	A	5.4 (8.6)	NS
				B	-0.2 (4.8)	
TAS (mmol/ml)	1.0 (0.2)	1.1 (0.3)	NS	A	0.1 (0.3)	NS
				B	- 0.0 (0.1)	

Data were represented as mean (SD). *A: Responder group (n=16); B: Non-responder group (n=5). Responders were defined as patients in whom the change in the swollen joint counts from baseline was higher than 50%. Wilcoxon's signed-ranks test was used for before-and-after comparisons, and comparisons between two groups were made using the Mann-Whitney U-test. BMI: body mass index; NS: not significant.

S.T. KIM[1,23], *KMD, PhD*
Y.J. KIM[2], *MSc*
J.Y. LEE[1], *KMD, MSc*;
H. LEE[1,4], *KMD, PhD*
C.S. YIN[1], *KMD, PhD*
S.M. CHOI[5], *KMD, PhD*
Y. CHAE[1,2], *KMD, PhD*
H. LEE[1,2], *KMD, PhD*
H.J. PARK[1,2], *KMD, PhD*

[1]Acupuncture & Meridian Science Research Center; [2]Department of Meridian & Acupoint, College of Korean Medicine, Kyung Hee University, Seoul, Republic of Korea; [3]School of Oriental Medicine, Pusan National University, Busan, Republic of Korea; [4]College of Korean Medicine, Sangji University, Wonju, Republic of Korea; [5]Department of Medical Research, Korea Institute of Oriental Medicine, Daejeon, Republic of Korea.

Address correspondence to: Dr. Hi-Joon Park, Department of Meridian and Acupoint, College of Korean Medicine, Kyung Hee University, 1 Hoegi-dong, Dongdaemoon-gu, Seoul 130-701, Republic of Korea. E-mail : acufind@khu.ac.kr

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