Acupressure on the Extra 1 Acupoint: The Effect on Bispectral Index, Serum Melatonin, Plasma β-Endorphin, and Stress

Argyro Fassoulaki, MD, PhD, DEAA*

Anteia Paraskeva, MD, DEAA*

Georgia Kostopanagiotou, MD*

Eleftheria Tsakalozou, MSc†

Sophia Markantonis, PhD†

BACKGROUND: Acupressure on the "extra 1" point decreases bispectral index (BIS) values and stress.

METHODS: We investigated the BIS, melatonin, β-endorphin, and verbal stress score values before, after 10 min of acupressure application on the extra 1 point, on a sham point, after no acupressure, and 1 h after completion of each intervention in 12 volunteers.

RESULTS: The BIS and verbal stress score values were decreased after acupressure on the extra 1 point ($P = 0.0001$ and $P = 0.008$, respectively), but melatonin and β-endorphin did not change.

CONCLUSION: Acupressure on the extra 1 point has no effect on melatonin and β-endorphin levels.

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Acupuncture techniques may be used perioperatively (1). Pressure application to the acupuncture extra 1 point decreases bispectral index (BIS) and stress values (2,3). The primary objective of our study was to investigate whether these decreases are associated with changes in melatonin and β-endorphin levels.

METHODS

After obtaining approval from the Hospital Ethics Committee as well as written informed consent from the subjects, four men and eight women, ASA I, aged between 28 and 35 yr were studied. Exclusion criteria included intake of any drugs with effect on the nervous system, insomnia, smoking, alcoholism, and familiarity with acupuncture.

The style of intervention was acupressure and the point used for treatment was the extra 1 point. The rationale for acupressure on the extra 1 point is based on the results of a previous study (2) in which acupressure on this point decreased BIS values and stress (STRICTA guidelines) (4).

Each volunteer received three treatments in a randomized manner. Each treatment was performed 1 day after the earlier treatment. Treatment A consisted of acupressure applied to the extra 1 acupoint. Treatment B consisted of pressure applied on a sham point located 2 cm from the lateral end of the eyebrow. Treatment C, the control, involved no pressure application.

Each subject was connected to a BIS monitor (2,5). Baseline values were obtained from three measurements 1 min apart, and averaged. For each measurement we recorded the median of three consecutive BIS

Figure 1. The Yingtang or "extra 1" point and the sham point.

From the *Department of Anesthesiology, Aretaieio Hospital, Medical School; and †Laboratory of Biopharmaceutics and Pharmacokinetics, School of Pharmacy, University of Athens, Athens, Greece.

Georgia Kostopanagiotou, MD, is currently at Department of Anesthesiology, Attikon Hospital, Haidari, Greece.

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Address correspondence to A. Fassoulaki, MD, PhD, DEAA, 57-59 Raftopoulou St., 11744 Athens, Greece. Address e-mail to afassou1@otenet.gr or fassoula@aretaieio.uoa.gr.

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Table 1. Cumulated BIS Values Before Applying Pressure on the "Extra 1" and on the Sham Points, 2.5, 5, 7.5, and 10.0 min During Pressure Application as well as 3 min After Pressure Release

Intervention	Before intervention	2.5 min of intervention	5 min of intervention	7.5 min of intervention	10 min of intervention	1 h after intervention
Extra 1 point	97 ± 1.1	53 ± 15.8	37 ± 15.0	37 ± 12.9,9	38 ± 14.9	97 ± 1.1
Sham point	94 ± 9.2	90 ± 7.8	86 ± 8.6	82 ± 10.7	87 ± 6.7	96 ± 2.3
Control	97 ± 0.8	94 ± 4.2	94 ± 3.9	95 ± 2.1	95 ± 3.6	97 ± 1.3

Values are mean ± SD. ANOVA $F = 52.579$, $df = 2$, $P = 0.0001$.

Cumulated BIS values recorded at the same time points but without pressure application (control).

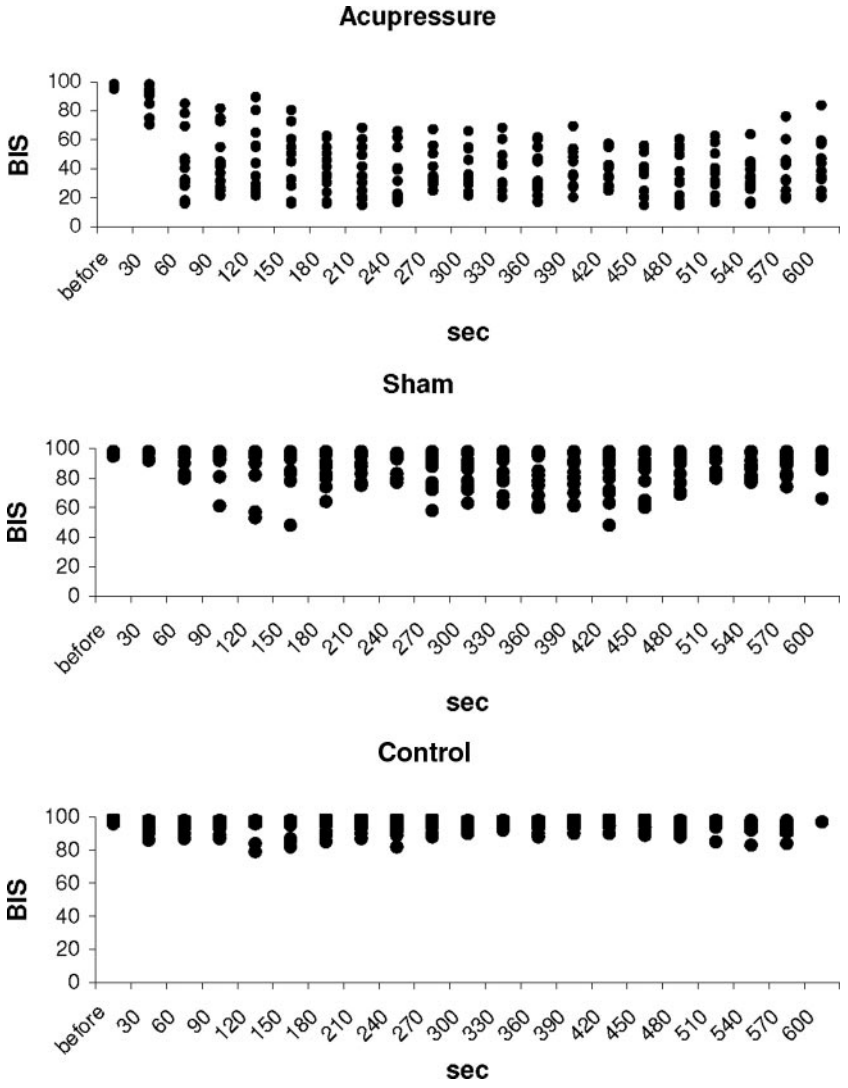

Figure 2. The individual bispectral index (BIS) values for each intervention, thus pressure on the "extra 1" point, on the sham point, or no pressure application (control).

values. The extra 1 point is located midway between the medial ends of the two eyebrows. The sham point was located 2 cm from the lateral end of the left eyebrow (Fig. 1). Pressure was applied by the thumb for 10 min while performing circular movements at a rate of 20–25 min^{-1}. Every 30-s three consecutive BIS values were read and the median value was recorded. When each intervention was completed, the BIS values were recorded as before treatment. Each of the subjects scored their stress levels before and after treatment, based on a verbal stress score (VSS, 0 = no stress to 10 = maximum stress).

Blood samples were collected before each treatment, after the conclusion of treatment, and 1 h after discontinuation of the treatments, centrifuged at 3000 rpm and kept at −80°C. Melatonin serum samples were analyzed by an enzyme immunoassay method (IBL Immunological Laboratories, Hamburg, Germany, http://www.IBL-Hamburg.com) (6). β-Endorphin plasma samples were analyzed by a competitive radioimmunoassay method using antibodies against synthetic human β-endorphin immunoassay (IBL Immunological Laboratories) (7).

Analysis of power for one-way design, assuming an α error 0.05, showed a power of 0.081. BIS values were

Table 2. Melatonin (pg/mL) and β-Endorphin (pmol/L) Levels Before, at the End of Each Intervention (Pressure Applied on the "Extra 1" Point, on a Sham Point, and No Pressure Application), as well as 1 h Later

Intervention	Melatonin	β-Endorphin
Before the intervention		
Extra 1 point	21.1 ± 24.2	4.54 ± 2.39
Sham point	19.5 ± 21.4	4.64 ± 2.13
Control	23.6 ± 28.0	4.48 ± 1.56
At the end of the intervention		
Extra 1 point	18.3 ± 20.1	4.21 ± 1.53
Sham point	16.2 ± 23.9	4.48 ± 1.43
Control	23.8 ± 23.5	4.47 ± 1.41
1 h after the intervention		
Extra 1 point	14.2 ± 16.7	3.84 ± 1.78
Sham point	16.11 ± 20.1	3.42 ± 1.45
Control	17.5 ± 19.1	4.52 ± 1.49

Values are mean ± SD.

analyzed by cohort analysis for every 2.5 min intervals, using two-way ANOVA with repeated measures after logarithmic transformation. For melatonin and β-endorphin levels, we calculated the differences from baseline to the end of intervention as well as to 1 h for each subject and compared these differences among the three groups with two-way ANOVA.

The VSS values within each intervention (before and 10 min after) were compared with the Wilcoxon's signed rank test and among the three interventions before and after treatment with the Kruskal–Wallis test. A P value of <0.05 was considered statistically significant.

RESULTS

The age of the 12 volunteers was 31 ± 2.2 yr, the body weight 66 ± 13 kg, and the height 169 ± 9 cm. Values are mean ± SD.

The BIS values before, during, and after interventions are shown in Table 1 and in Figure 2. These values differed among the interventions ($P = 0.0001$) for the time effect ($P = 0.0001$) and for intervention effect ($P = 0.0001$).

The differences in melatonin and β-endorphin from baseline immediately after the intervention and at 1 h after are shown in Table 2 and in Figures 3 and 4.

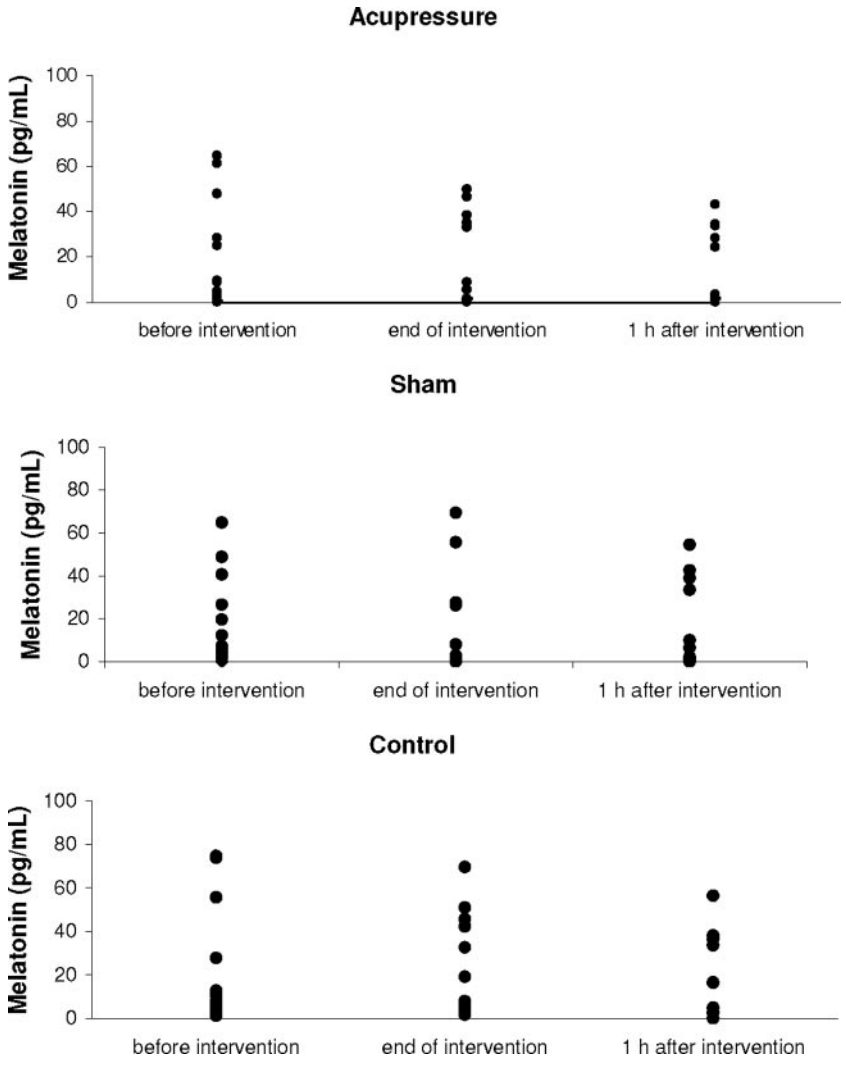

Figure 3. The individual melatonin values (pg/mL) obtained before, immediately at the end, and 1 h after each intervention, thus pressure on the "extra 1" point, on the sham point, or no pressure application (control).

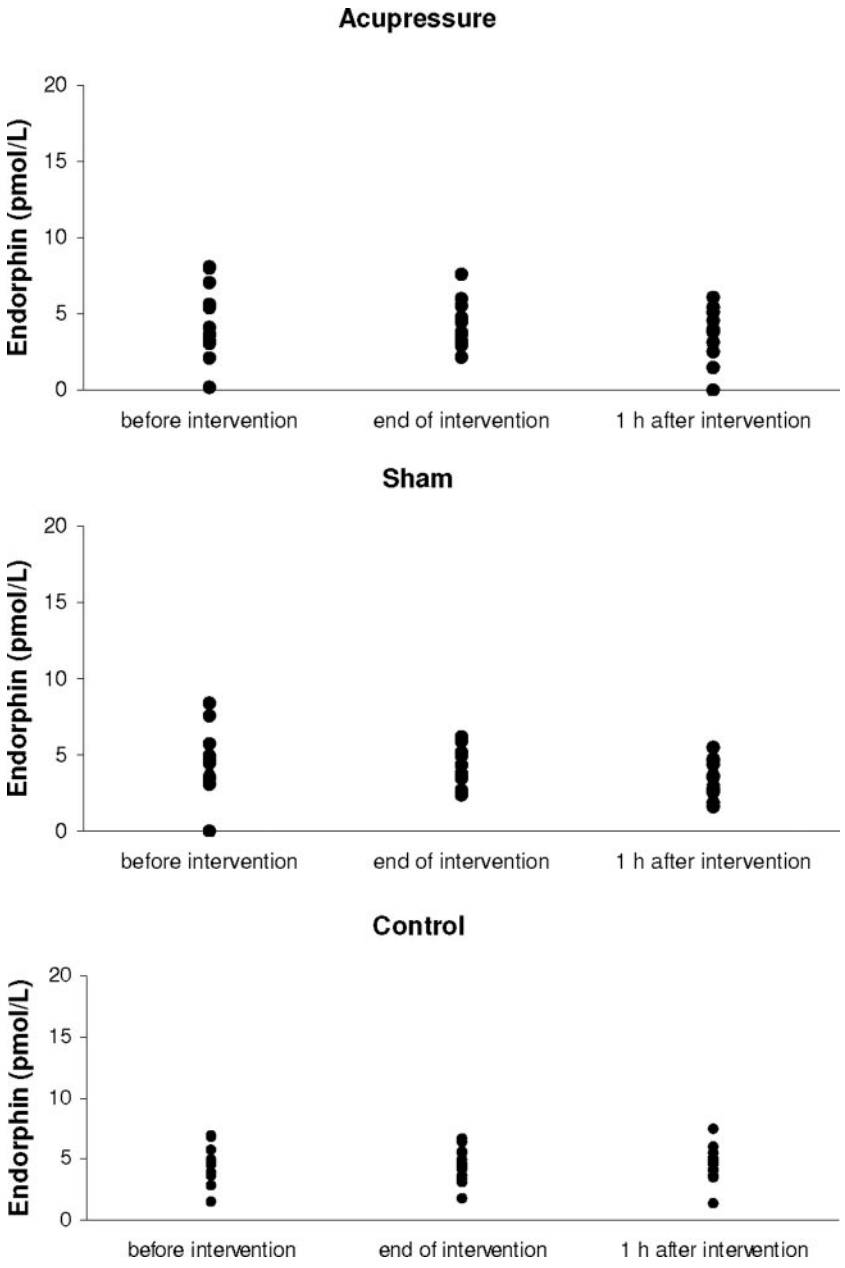

Figure 4. The individual β-endorphin (pmol/L) values obtained before, immediately at the end, and 1 h after each intervention, thus pressure on the "extra 1" point, on the sham point, or no pressure application (control).

There was no statistically significant effect of the intervention on the change.

The VSS baseline values (median (range) 5, (5) 4.5 (8), and 3.5 (6) for the extra 1, the sham point, and no intervention, respectively) did not differ before the interventions ($P = 0.260$). These values immediately after the interventions were 1 (3), 3 (10), and 2.5 (5), respectively, ($P = 0.008$) (Fig. 5). VSS values differed after acupressure on the extra 1 point and after no pressure ($P = 0.002$ and $P = 0.011$, respectively), but not after acupressure on the sham point ($P = 0.169$).

DISCUSSION

Our results show that acupressure on the extra 1 point decreased BIS and VSS values, but had no effect on the melatonin and β-endorphin levels. Auricular acupressure decreases anxiety in patients during their transport to the emergency department (8) and preoperatively in outpatients undergoing ambulatory surgery (9).

The background of the practitioner can influence the outcome of the treatment. All interventions were applied by the first author who studied acupuncture 10 yr ago in Athens and in Beijing at the College of Acupuncture and Orthopedics (STRICTA guidelines, as shown in Ref. 4).

We did not record the duration of decreased stress postintervention. We measured the stress by the VSS used in previous studies (2,3,8,10). The state trait anxiety inventory (STAI) scoring preoperative anxiety (11) may be a preferred tool. However, the VSS in volunteers may not be comparable with those of patients waiting for surgery.

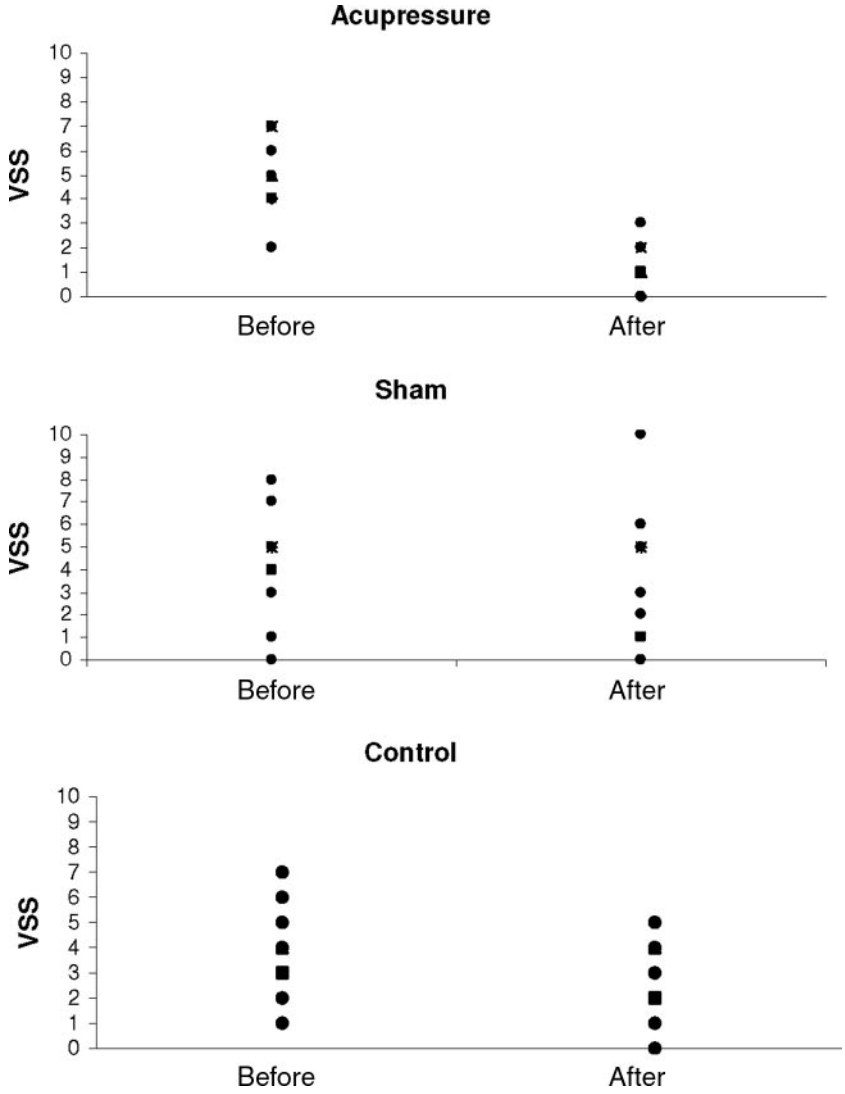

Figure 5. The individual verbal stress scores (VSS) obtained before and immediately after each intervention, thus pressure on the "extra 1" point, on the sham point, or no pressure application (control).

We found no changes in melatonin and β-endorphin, although endorphin release is a mechanism of action of acupuncture analgesia. This hypothesis is supported by the antagonism of the analgesic effect of acupuncture by naloxone (12). The acupuncture point and the type and duration of treatment may affect the intervention outcome (13,14). Whether acupressure differs from acupuncture in the type and size of response is unknown. Our negative results may have been due to the variability of melatonin values, to the limited number of time points we collected blood samples, and/or to the lack of adequate power. We, therefore, consider these results to be preliminary. The random application of the interventions allowed for the applications to occur in all possible orders, minimizing the possibility of carryover effects among treatments.

In conclusion, acupressure on the extra 1 point had no effect on melatonin and β-endorphin levels. However, as it was successful in producing stress relief, the technique can be used as a form for premedication in ambulatory patients.

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ERRATUM

In the July 2006 issue of *Anesthesia & Analgesia,* in the article by Boldt et al., "The Value of an Albumin-Based Intravascular Volume Replacement Strategy in Elderly Patients Undergoing Major Abdominal Surgery" (Anesth Analg 2006;103:191–9), there are three errors in the Discussion section on page 198, right column. In the paragraph beginning with "One problem with the present study . . . ," in the first, fifth, and seventh lines, the word "intramuscular" was used due to a copyediting error. The correct word should be "intravascular." The publisher regrets the error.