
Gerhard Litscher

Biomedical Engineering and Research, Department of Anesthesiology and Critical Care, University of Graz, Austria

The purpose of this randomized, placebo-controlled, cross-over study was to investigate mean blood flow velocity (V̇m) of the ophthalmic (OA) and the middle cerebral (MCA) artery during traditional Chinese-acupuncture (TCA), ear acupuncture (EA), Korean hand acupuncture (KHA) and placebo needling (PN) by simultaneous and continuous transcranial Doppler sonographic monitoring. We examined 20 healthy volunteers 19-45 years old (mean age: 30.2 ± 6.0 years) in OA was significantly increased during needling vision-related acupoints of TCA (p < 0.01), EA (p < 0.001) and KHA (p < 0.001), whereas nonsignificant alterations occurred in V̇m of MCA. All subjects showed insignificant changes in mean arterial blood pressure. The study design does not allow to evaluate why and how the different acupuncture methods have an effect on the brain and eye, however it proves that acupuncture can provide scientifically measurable effects. (Neural Res 2002; 24: 377-380)

Keywords: Acupuncture, transcranial Doppler sonography (TCD); cerebral blood flow velocity; ear acupuncture; Korean hand acupuncture

INTRODUCTION

Acupuncture is based on the experiences of traditional Chinese medicine and produces specific and reproducible effects on cerebral blood flow velocity. This has been demonstrated in several studies recently. Using transcranial Doppler (TCD) ultrasound in conjunction with special probe holder constructions it is possible to noninvasively and continuously assess blood flow profiles in the major intracranial arteries. The aim of this study was to simultaneously and continuously measure cerebral blood flow velocity in the middle cerebral artery (MCA), as well as in the ophthalmic artery (OA) in healthy volunteers before, during and after manual traditional Chinese acupuncture, ear acupuncture and Korean hand acupuncture by means of needle-related acupoints.

MATERIALS AND METHODS

A total of 20 healthy volunteers (14 females, 6 males; mean ± SD age 26.2 ± 6.0 years, range 21-45) were examined. The study protocol was approved by the ethics committee of the University of Graz (31-017ex00/01) and all subjects gave written informed consent.

The test persons were positioned on a bed in the biomedical engineering lab with eyes closed. None of the volunteers had visual deficits and all were free of neurological or psychological disorders and were not taking any medication. They were paid for their participation.

Blood flow velocity was measured continuously and simultaneously in the OA and the MCA by transcranial Doppler sonography using a new probe holder construction.

A 10 min resting period one of the acupuncture schemes (Figure 1, upper panel A-D) was selected in a randomized cross-over study design. Scheme A consisted of two traditional Chinese acupuncture: UB.2 Zan Zhu (Location: In the depression of the medial end of the eyebrow. Method: Puncture transversely 0.5-0.8 cm) and EX.3 Yuyao (Location: At the midpoint of the eyebrow. Method: Puncture transversely 0.3-0.5 cm). Scheme B used two ear acupoints (Liver and eye, compare Figure 1, ear map). Scheme C contained two vision-related acupoints from Korean hand acupuncture (E2) and one from Chinese hand acupuncture (Yan Di An). Scheme D consisted of one 'placebo point' (lateral from the radius 6 cm above the carpal fold; compare Figure 1, upper panel, right, D) on the forearm.

The acupuncture were punctured with sterile, single-use needles after local disinfection of the skin. We used three different types of needles. Schemes A and D: 0.25 x 25 mm, Huan Qiu, Suzhou, China: Scheme B: 0.2 x 13 mm, European Marco Polo Comp., Albi, France; Scheme C: 0.1 x 8 mm, Soo Ji-Chim, Korea.

Stimulation was achieved by rotation with lifting and thrusting of needles. A toning technique was used.

We evaluated mean blood flow velocity (V̇m cm/sec) simultaneously and continuously in the OA and MCA using a new construction (compare Figure 1,
upper panel, A and D) and a Multi-Dop T device (OWL Electronic Systems GmbH, Sippingen, Germany).

Each person was studied with four different acupuncture schemes (A–D). The choice of the measuring procedure was randomized and the interval between the phases A–D was at least 20 min.

The data were tested with analysis of variance (one-way repeated-measure ANOVA) using SigmaStat (Jandel Scientific Corp., Erkrath, Germany). As post hoc analysis Friedman repeated measures analysis of variance on ranks was used. The results were given as means ± standard error (SE). Changes were considered significant at a p-value < 0.05.

RESULTS

Figure 1 summarizes the demographic data, the different acupuncture schemes and results of \( v_m \) in the OA and MCA.

Note the highly significant (p < 0.001) increase of \( v_m \) in the OA during (b) acupuncture after needling the traditional Chinese acupoints Zanzhu and Yuyao (scheme A). At the same time almost no changes in \( v_m \) were seen in the MCA. Also significant changes (p < 0.05) of \( v_m \) in OA were found after ear acupuncture and Korean and Chinese hand acupuncture. Only slight, nonsignificant changes occurred after placebo needling. The mean arterial blood pressure was not significantly changed during or after acupuncture or placebo needling.

Figure 2 shows a typical example of the trend of \( v_m \) in the ophthalmic and the middle cerebral artery before and after needling the two acupoints Zanzhu and Yuyao.

DISCUSSION

Among the various modalities of integrative medicine, acupuncture is regarded as one of the better studied. Hundreds of randomized controlled trials on acupuncture have been published. Positive effects on cerebral blood flow due to acupuncture have also been repeated and corroborated. However, there is no study in scientific literature which shows a comparison of different acupuncture methods (traditional Chinese-,
Figure 2: Blood flow profiles and trend of mean velocity in the ophthalmic (OA) and middle cerebral artery (MCA) before and after acupuncture scheme A; compare Figure 1. Note the specific increase of $v_m$ in the OA at the beginning of acupuncture (arrow).
Cerebral blood flow velocity and acupuncture: Gerhard Litscher

significantly after needling vision-related acupoints. The effect was more pronounced \((p < 0.001)\) using two points (Zanzhu and Yuyao) from traditional Chinese ‘body acupuncture’ than using ear- or hand acupuncture. Nevertheless the effects were also significant \((p < 0.05)\) in ear- and hand acupuncture. Placebo needling on the other hand shows only minor changes in cerebral blood flow velocity. The method used in this study is not able to evaluate why and how the different acupuncture methods have an effect on the brain and eye; however it proves that acupuncture can provide scientifically measurable effects

CONCLUSION

We found specific significant alterations in blood flow velocity of the ophthalmic artery after needling vision-related acupoints on the body, ear, and hand, but the study design does not allow to draw conclusions regarding the underlying mechanisms.

ACKNOWLEDGEMENTS

The study was supported by the Austrian Ministry of Transportation, Innovation and Technology (GZ 140753/I-VI/6/99). Great appreciation is expressed to Kyu Hyun Park, Professor of Neurology, College of Medicine, Pusan National University, Korea and to Tae-Woo Yoo OMD, PhD, the founder and head of the Koroyo Hand Therapy Institute, Seoul, Korea for their encouragement and support. The author would like to express his thanks to Dr Lu Wang, Mag. Petra Petz and

Evamaria Huber (all Biomedical Engineering and Research, Department of Anesthesiology and Critical Care, University of Graz) for their valuable help.

REFERENCES

9. Lewith GT. The history of acupuncture in the West. 12/2001; http://www.lewith.net/pdf/papers/lal1720