

Hemodynamic and stress response after sound intervention with different headphone systems: A double-blind randomized study in healthy volunteers

Anna Hohnneck^{1,2}, Christina Reyser³, Rimma Usselmann³, Lara Heinemann³, Simone Weingärtner³, Hardy Reckling⁴, Gerhard Schumacher⁵, Iris Burkholder⁶, Kirsten Merx³, Wolf Karsten Hofmann³, Ralf-Dieter Hofheinz³

¹ Department of Cardiology, Angiology, Haemostaseology and Medical Intensive Care, University Medical Centre Mannheim, Medical Faculty Mannheim, Heidelberg University, Germany

² European Center for AngioScience (ECAS) and German Center for Cardiovascular Research (DZHK) partner site Heidelberg/Mannheim, Mannheim, Germany

³ Department of Hematology and Oncology, University Medical Centre Mannheim, Heidelberg University, Mannheim, Germany

⁴ Corporate health management, University Medical Centre Mannheim, Medical Faculty Mannheim, Heidelberg University, Germany

⁵ inmediQ GmbH, Butzbach, Germany

⁶ StaBiL Statistical and Biometric Solutions, Zweibrücken, Germany

ABSTRACT –

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AIM

The present double-blind randomized study investigates the effects of a sound intervention on cardiovascular parameters, indicators of stress and subjective feelings. Two headphone systems using different sound systems are compared within this trial.

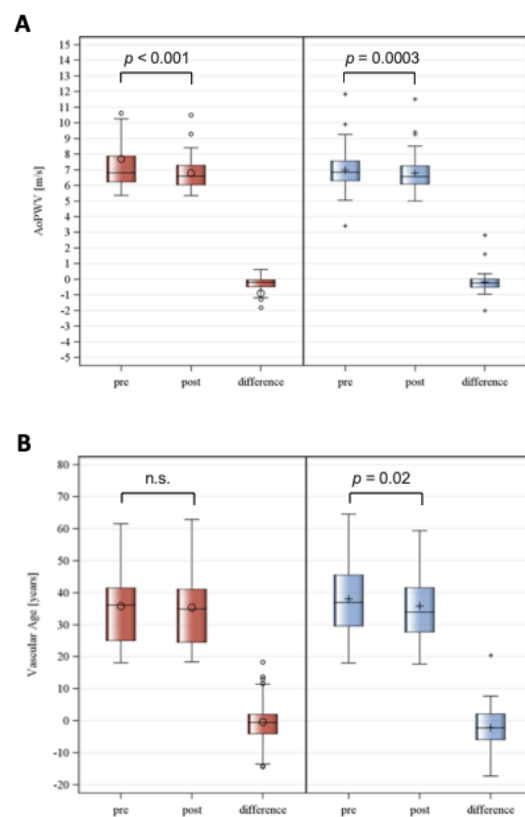
METHODS

Hundred volunteers reporting elevated stress levels participated in the study between July and September 2020. Participants were randomized to a 12-minute sound intervention (classical music) with either conventional headphones (CH; “MEZE 99 Classic”) or with the same – but internally modified – headphone (called “Lautsänger”). Cardiovascular parameters were measured with the VascAssist2.0, both before (pre) and after (post) sound interventions. In addition, participants were asked to complete questionnaires on burnout risk (modified Maslach Burnout Inventory, MBI) and emotions /stress.

RESULTS

The study population consisted mainly of female participants (n=83), with the majority being students (42%). Median age was 32.5 years (range 21 – 71). According to the MBI, eight participants showed indices for an elevated burnout risk.

In terms of objective measurements with VascAssist 2.0, each treatment arm led to a significant reduction of aortic pulse wave velocity and heart rate, while heart rate variability remained unaffected. A significant reduction in resistance index (median reduction, -1.7, $p = 0.0008$) and vascular age as a combined variable (median reduction -2.3 years, $p = 0.02$) was only documented with Lautsänger. Treatment groups were comparable in terms of subjective feedback by participants: a significant increase in emotional well-being was achieved with both headphone systems. Likewise, significant improvements were also noted for anxiety, sadness and the reduction of anger.



Comparison of A) aortic pulse wave velocities (AoPWV) and B) vascular age for sound intervention with conventional headphones (red) and Lautsänger (blue). While both treatment arms led to a significant reduction in AoPWV, vascular age was only influenced by Lautsänger.

CONCLUSION

Healthy volunteers reporting subjective symptoms of stress achieved objective cardiovascular improvements after a single short term sound intervention, using two different headphone systems in this double-blind randomized trial. Moreover, significant emotional improvement was reported within both arms. Our results indicate additional benefit in terms of “vascular age” and resistance index with the “Lautsänger” system.