



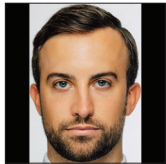
Letter to the Editor

Before microsurgical skill training on a simulator is recommended to reduce hand tremors, appropriate studies must demonstrate its benefit

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Dear Sir,

We read with interest the article by Bykanov *et al.* on the reduction of hand tremors by training microsurgical skills on a self-invented simulator.^[1] The simulator was used for the training of spatial microsurgical precision and the assessment of microsurgical hand tremors and was used by the residents of the reporting hospital for 2 years during the COVID-19 pandemic.^[1] The authors have received only positive feedback from the residents in their department, especially about the enhanced version with the accelerometer.^[1] The study is excellent, but some points should be discussed.

The first point is that the effectiveness of the device has not been investigated in an adequate study.^[1] A blinded, prospective, multicenter, and controlled study is needed to assess whether or not such a training method is truly beneficial for a specific indication. Subjective reports of a positive effect are scientifically dubious and prone to bias.

The second point is that it is questionable whether tremors of any kind can be reduced by training or not. In the majority of cases, tremors are involuntary and, therefore, not amenable to voluntary control. For example, it is not possible to reduce tremors in Parkinson's disease through any exercise. Although exercise helps to relieve muscle tension and relax the body overall, tremors can only benefit from such exercise methods if it is due to increased stress. For all other types of tremors, exercise training to reduce hand tremors is usually ineffective.

The third point is that tremors of the hand can have different causes. In general, tremors can be primary (genetic) or secondary (acquired). Genetic tremors, in particular, cannot usually be treated with physical training or exercises. In the case of secondary tremor, the effect of training also depends heavily on the specific causes of the tremors. Secondary tremors can be caused by non-hereditary Parkinson's disease, hyperthyroidism, hypoglycemia, multiple sclerosis, stroke, cerebral hemorrhage, depression, and anxiety. In addition, secondary tremors can be due to medication or drugs, including illegal drugs. Medications known to cause tremors include cytarabine, thalidomide, valproic acid, theophylline, albuterol, cyclosporine, tacrolimus, lithium, caffeine, amphetamine, selective serotonin reuptake inhibitors, tricyclic antidepressants, amiodarone, procainamide, steroids, acyclovir, vidarabine, certain antibiotics, alcohol, nicotine, certain antihypertensive agents, epinephrine, norepinephrine, tiratricol (weight loss agent), levothyroxine, or tetrabenazine. Before

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starting the exercises on the simulator, any known trigger of the hand tremors must be stopped by omitting the triggering agent to check whether the tremors disappear simply by omitting the triggering agent.

The fourth point is that no recommendations were made to reduce tremors through stress reduction methods. Since stress and adrenergic overstimulation may be the primary causes of hand tremors in surgical residents, recommendations for reducing stress in surgeons should be included. These recommendations should include avoiding all adrenergic stimulants, avoiding sleep deprivation, avoiding illicit drugs and medications that cause tremors, and treating metabolic and endocrine disorders as well as anxiety and depression if these are responsible for tremors.

To summarize, this interesting study has limitations that put the results and their interpretation into perspective. Addressing these limitations could strengthen the conclusions and support the message of the study.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Bykanov A, Kiryushin M, Trube M, Rastvorova O, Ilia C, Pitskhelauri D. A novel low-cost device for tool targeting training and microsurgical hand tremor assessment. *Surg Neurol Int* 2024;15:227.

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