The study of sensorimotor integration in migraine reveals basal ganglia disfunction related to consumption of medications taken for acute headache attack.

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Introduction

Neurophysiological and neuroimaging studies have shown dysfunctions of brain areas responsible for multisensory integration in migraine. Among these areas, the basal ganglia, the thalamus, and the primary somatosensory area (S1) play a major role in sensorimotor integration. One of the experimental approaches to assess mechanisms of sensorimotor integration and sensory gating is to measure the somatosensory temporal discrimination threshold (STDT)- i.e. the shortest interval at which an individual recognizes two stimuli as separate in time- at rest and during movement execution. STDT involves the activation of the subcortical network signalling salient events and S1. Testing STDT during movement execution (sensory gating) involves basal ganglia/thalamus interplay. Here we investigated STDT tested at rest and during index finger abductions in patients with migraine without aura during and outside the attacks.

Materials and Methods

We tested STDT in 24 migraine without aura patients, 16 in between attacks (MO) and 9 during an attack (MI). The patients were compared with a group of 30 healthy volunteers (HVs). STDT was tested at rest and during index finger abductions (at movement onset and 100, 200, and 500 milliseconds afterwards – Figure 1).

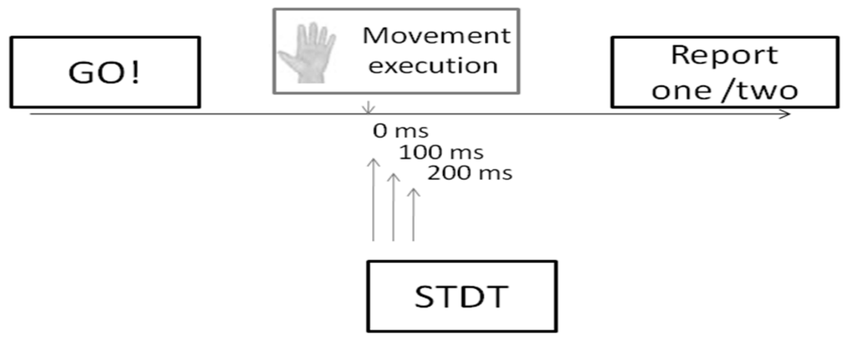

Figure 1: Experimental protocol

Results

Compared to HV, basal STDT values and those obtained 500ms after movement onset (when movement is already ceased) were significantly reduced in MI patients ($p = 0.013$), with MO patients falling in between HV and MI. When data of MO and MI patients were combined, Pearson's test disclosed that STDT value tested at rest and that obtained 500ms after movement onset correlated negatively with monthly number of medications taken for acute headache attack. No significant differences or correlations were instead observed in STDT values tested during movement executions.

Discussion and Conclusions

Here we have reported reduced STDT values in patients with migraine during an attack. In addition, we have observed a close relationship between electrophysiological abnormalities and the number of acute medications consumed monthly. Conclusion - Further studies are needed to understand whether these changes suggest an abnormally hyperactive subcortical network signalling salient events during migraine attack, which would send excessive information to S1, or to medication-induced neural adaptation promoted by changes in basal ganglia neurotransmission.

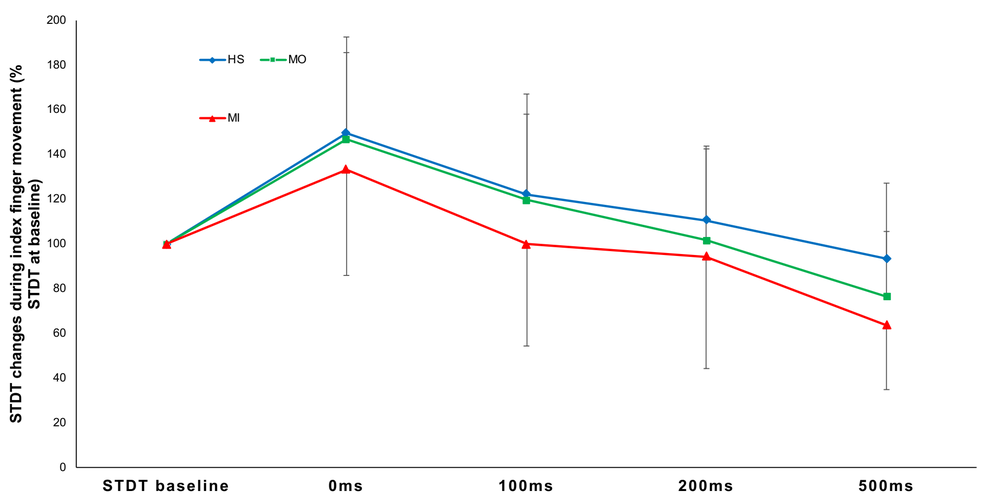

Figure 2

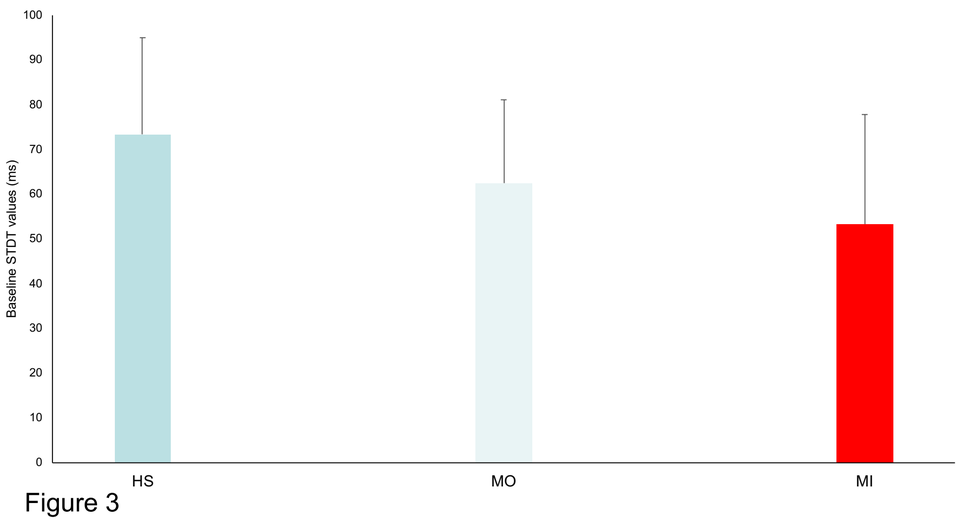

Figure 3

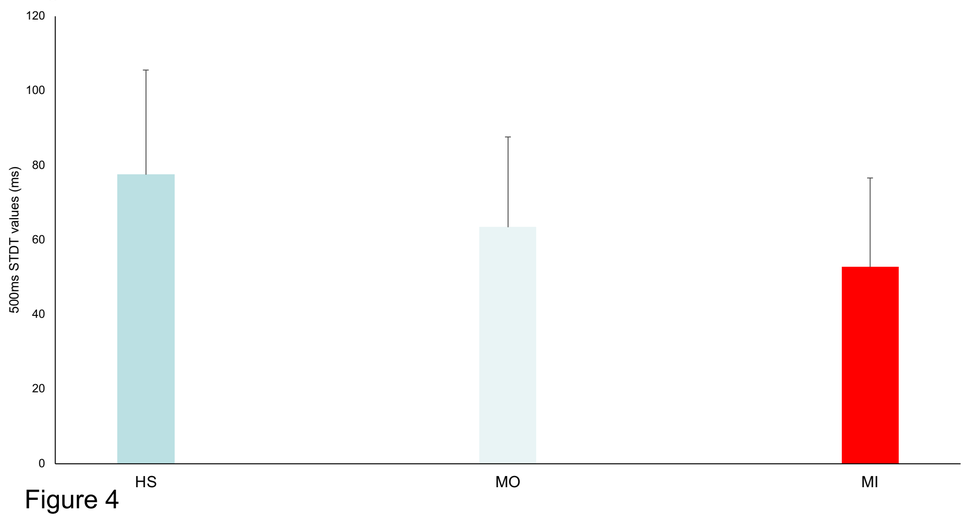

Figure 4

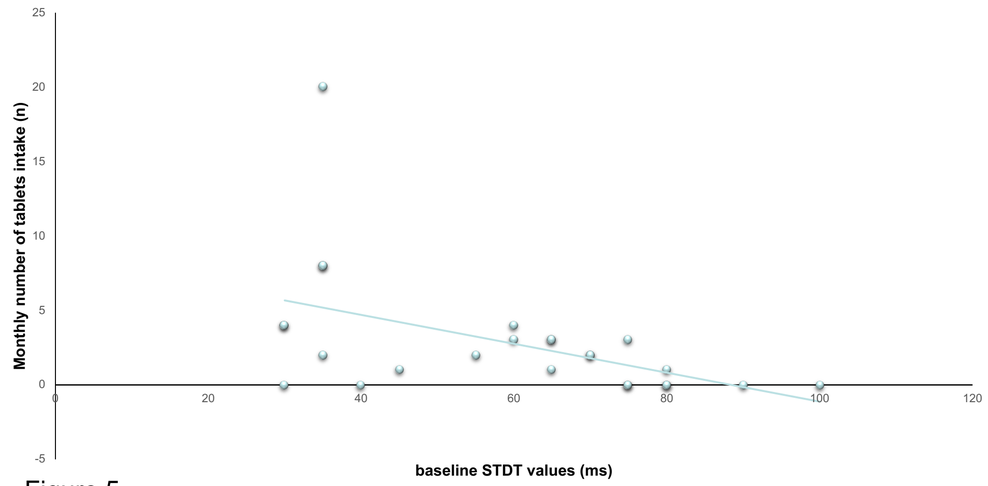

Figure 5

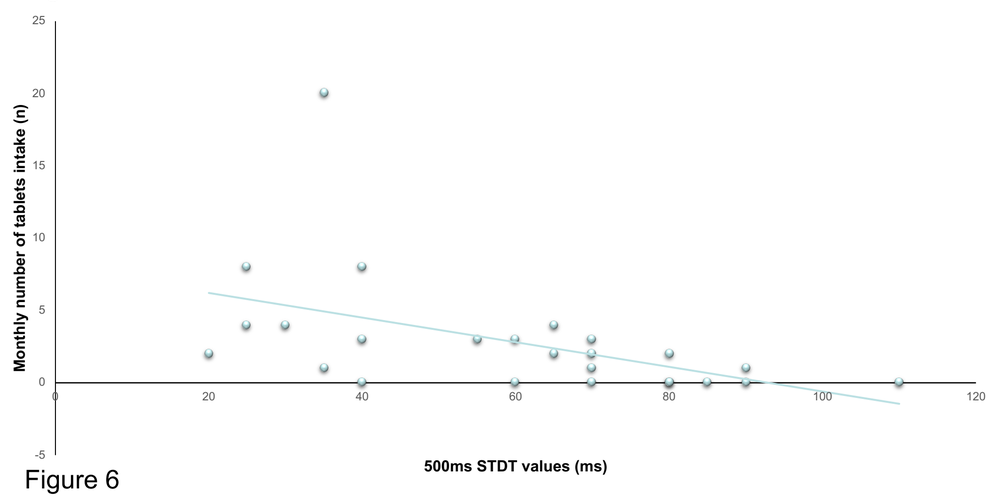

Figure 6

Bibliografia

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