

FINGER ORTHOSES AS A MEANS OF REDUCING COGNITIVE DEMAND REQUIRED OF FUNCTIONAL TASKS IN INDIVIDUALS WITH EHLERS-DANLOS SYNDROME? OPORNICE ZA PRSTE KOT SREDSTVO ZA ZMANJŠANJE KOGNITIVNIH ZAHTEV PRI FUNKCIJSKIH NALOGAH ZA OSEBE S SINDROMOM EHLERS-DANLOS?

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Povzetek

Izhodišča

Sindrom Ehlers-Danlos (EDS) je skupina dednih bolezní, ki prizadenejo vezivno tkivo. Različni tipi EDS imajo različne klinične slike, mnogim pa je skupen simptom hude hiper mobilnosti. EDS je povezan tudi z utrujenostjo, izpahi sklepov, mišično šibkostjo in bolečino (1). Hiper mobilnost prstov lahko pri osebah z EDS močno prizadene funkcijske zmožnosti zgornjih udov in verjetno je, da razmeroma preproste naloge zahtevajo več časa in pozornosti kot pri osebah brez diagnoze EDS. Zato se pogosto predpiše opornice za prste, ki nudijo stabilnost in preprečujejo neželene gibe proksimalnih in distalnih interfalangealnih sklepov.

Pozornost je v splošnem definirana kot proces izbiranja in usmerjanja duševnega napora na določen dražljaj (2). Kot področja možganov, povezana s pozornostjo, viri pogosto navajajo dorzolateralni prefrontalni korteks (dlPFC), ventrolateralni prefrontalni korteks (vlPFC) in dorzalna anteriorna cingulatna guba (dACC). To lahko merimo z različnimi tehnikami slikanja možganov. Namen naše študije je bil ugotoviti, ali opornice za prste osebam z EDS in hiper mobilnostjo pomagajo zmanjšati zahteve za pozornost pri opravljanju funkcijskih nalog z rokami.

Abstract

Background

Ehlers-Danlos Syndrome (EDS) is a group of hereditary disorders that affect connective tissues. While there are numerous types of EDS with differing clinical presentations, several types share the symptom of severe hypermobility. EDS is also associated with fatigue, joint dislocation, muscle weakness and pain (1). Hypermobility of the fingers can severely affect upper extremity functional performance in individuals with EDS and it is likely that relatively simple tasks require more time and attentional demand than they would for an individual without the diagnosis. To address this issue, finger orthoses are often prescribed to provide stability and prevent undesirable movement at the proximal and distal interphalangeal joints.

Generally, attention is defined as the process of selecting and directing mental effort towards a stimulus (2). Neural substrates associated with attention are often cited to include the dorso-lateral prefrontal cortex (dlPFC), the ventrolateral prefrontal cortex (vlPFC) and the dorsal anterior cingulate (dACC). This can be measured by a variety of imaging systems. The aim of this study was to determine if finger orthosis can assist in reducing the attentional demand required to perform upper-extremity functional tasks in individuals with EDS who have hypermobility.

Metode

V študijo smo vključili 14 oseb z EDS in klinično ugotovljeno hipermobilnostjo. Vsak udeleženec je opravil štiri teste funkcije rok z opornicami za prste in brez njih, pri čemer smo ga snemali s sistemom za funkcijsko bližnje infrardečo spektroskopijo (fNIRS). fNIRS omogoča funkcijsko slikanje struktur možganske skorje s spremljanjem sprememb koncentracije oksigeniranega in deoksiniranega hemoglobina. Vsi udeleženci so opravili Test škatle in kock, test pisanja, nalogo nalivanja vode in pobiranja kovancev z mize. Vrstni red opravljanja nalog z opornicami oziroma brez njih smo določili slučajno.

Rezultati

Analizirali smo relativno koncentracijo oksigeniranega in deoksiniranega hemoglobina med opravljanjem nalog z opornicami in brez njih. Rezultati so v splošnem pokazali značilno zmanjšanje oksigeniranega hemoglobina v prefrontalnem korteksu, ko so udeleženci nosili opornice za prste.

Zaključek

Rezultati naše študije nakazujejo, da so opornice za prste, ki pomagajo proti hipermobilnosti, učinkovite za zmanjšanje zahtev za pozornost pri opravljanju funkcijskih nalog z rokami.

Methods

14 individuals with EDS and a clinical presentation of hypermobility were recruited for this study. Each participant performed 4 tests of upper extremity function with and without their finger orthoses and while fitted with a Functional Near Infrared Spectroscopy system (fNIRS). fNIRS allows functional imaging of cortical brain structures by monitoring concentration changes in oxygenated and deoxygenated hemoglobin.

Specific tests performed by each participant included a targeted Box and Block test, a writing test, a water pouring task and picking up coins from a table. The order of testing (orthosis, no-orthosis) was randomized.

Results

Data was analysed compare the relative concentration of oxygenated and deoxygenated haemoglobin while performing each task with and without finger orthoses. Results generally indicated significantly reduced concentrations of oxygenated haemoglobin in the pre-frontal cortex when participants wore their finger orthoses.

Conclusion

Results from this study suggest that finger orthoses designed to manage hypermobility of the fingers are effective in reducing the attentional demand required to perform upper extremity functional tasks.

References/literatura

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