

RELATIVE EFFECTS OF ANKLE FOOT ORTHOSES ON BALANCE

RELATIVNI UČINEK ORTOZ ZA GLEŽENJ IN STOPALO NA RAVNOTEŽJE

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Povzetek

Izhodišča

Ortoze za gleženj in stopalo (OGS) so praviloma narejene tako, da omejujejo gibanje v gleženjskem sklepu v eni ali več ravninah. Ker je ravnotežje moteno, kadar je gibljivost sklepa omejena, je klinično pomembno razumeti relativni učinek OGS na ravnotežje. Ravnotežje je kompleksna zmožnost, potrebna za vzdrževanje težišča telesa znotraj okvira podpore pri stanju na mestu (statično ravnotežje) in nadzorovanje težišča v gibanju, npr. pri hoji ali ko nas nekaj vrže iz statičnega ravnotežja (dinamično ravnotežje). V prispevku se osredotočamo na rezultate sistematičnega pregleda dokazov o učinku OGS na statično in dinamično ravnotežje.

Metode

Preiskali smo medicinske bibliografske podatkovne zbirke in našli 37 člankov, ki so ustrezali vključitvenim kriterijem. Članke smo razvrstili v dve glavni področji: tiste, ki so poročali o uporabi OGS v športu (športne ortoze, 18 raziskav), in tiste, ki so poročali o raziskavah ortoz za olajšanje premikanja osebam z motnjami gibanja (ortoze za hojo, 19 raziskav). Metodološko kakovost člankov smo ocenili s pomočjo obrazca Ameriške akademije za protetiko in ortotiko (1).

Rezultati

Športne ortoze:

V večini raziskav o vplivu športnih ortoz na ravnotežje so uporabili serijsko izdelane ortoze z vezalkami in/ali poltrdega tipa. Učinka oblike ortoze na ravnotežje ni bilo opaziti.

Večina raziskav je vključila osebe brez zmanjšanih zmožnosti in rezultati v splošnem kažejo, da športne ortoze nimajo niti pozitivnega niti negativnega učinka na ravnotežje pri tej

Abstract

Background

Ankle foot orthoses (AFOs) are typically designed to limit motion of the ankle joint in one or more planes. Given that balance is compromised when joint range of motion is restricted, an understanding of the relative effects of ankle foot orthoses on balance performance is clinically relevant. Balance is a complex skill necessary to maintain the body's center of gravity within the base of support while stationary (static balance) and to control the center of mass in dynamic situations such as walking or when subject to a destabilizing event (dynamic balance). This presentation will focus on results of a systematic review that aimed to evaluate evidence related to the effects of ankle foot orthoses on static and dynamic balance.

Methods

A search of medical databases was conducted. 37 articles were found to satisfy the predetermined inclusion criteria. Articles were categorized under two main areas; those investigating the use of ankle foot orthoses designed for sporting applications (sports orthoses, 18 studies) and those investigating orthoses that are intended to facilitate ambulation in subjects with locomotor disorders (ambulatory orthoses, 19 studies). Methodological quality of articles was evaluated using the American Academy for Prosthetics and Orthotics SSC Quality Assessment Form (1).

Results

Sports orthoses:

The majority of research addressing the influence of sports orthoses on balance utilized either lace-up and/or semi-rigid Off-The-Shelf designs. Design of the orthoses did not appear to have any effect on balance performance.

populaciji. Nekaj raziskav je vključilo osebe z diagnosticirano nestabilnostjo gležnja. Rezultati teh študij s srednjo stopnjo zanesljivosti dokazov kažejo, da pri tej kohorti športne orteze lahko izboljšajo ravnotežje. Dva članka sta obravnavala orteze kot potencialni olajševalec samoznavanja. Žal omejitve načrta raziskave v nobenem od teh dveh člankov ne omogočajo zanesljivih sklepov.

Ortoze za hojo:

Obstajajo dokazi nizke do srednje ravni, da je dosežek na nekaterih merah izida, povezanih z ravnotežjem, odvisen od biomehaničnih značilnosti OGS. Zanimivo je, da pri osebah z motnjami hoje trde orteze niso povzročile spremembe ali izboljšanja dosežkov na testih statičnega ravnotežja, so pa bile povezane s poslabšanjem na testih dinamičnega ravnotežja. Rezultati različnih študij na visoki ravni dokazov kažejo, da imajo lahko orteze na listnato vzmet pozitiven učinek na ravnotežje pri odraslih osebah s hemiplegijo po kapi. Rezultati raziskav uporabe nadgleženjskih ortoz s srednjo ravno zaupanja kažejo, da lahko tovrstne orteze izboljšajo ravnotežje pri otrocih s cerebralno paralizo.

Zaključek

Združeni rezultati raziskav o športnih ortozah kažejo, da te ne motijo ravnotežja, kadar jih uporabljamo kot zaščitni ukrep pri normalnih populacijah. Če jih uporabljamo kot preventivni ukrep pri populacijah z nestabilnostjo gležnja, imajo lahko celo pozitiven učinek na različne mere izida, povezane z ravnotežjem. Rezultati raziskav o OGS za hojo nudijo nekaj dokazov o tem, da je ravnotežni izid odvisen od lastnosti in oblike orteze. Trdne orteze so primerne za naloge statičnega ravnotežja, bolj gibljive orteze pa so primernejše v pogojih, ki zahtevajo dinamično ravnotežje.

Most studies included able-bodied subjects and results largely indicate that sports orthoses have neither a positive or negative effect on balance in this population. A small number of studies included persons with diagnosed ankle instability. Results from these studies suggest, with a moderate level of confidence, that sports orthoses can facilitate balance in this cohort. Two papers specifically addressed the issue of orthoses as a potential facilitator for proprioception. Unfortunately, study design limitations in both papers preclude any conclusive statements.

Ambulatory orthoses:

Low to moderate evidence was found to suggest that performance on certain balance related outcome measures is dependent upon the specific biomechanical design of the AFO. Of interest is that use of rigid orthoses tended to result in either no change, or improvement of performance on static balance tests but was associated with a deterioration in performance under dynamic test conditions for persons with gait abnormalities. Results from several studies suggest, with a high level of confidence, that leaf spring orthoses may have positive effects on balance in adults with stroke induced hemiplegia. Results about the use of supra-malleolar orthoses suggested, with a moderate level of confidence, that they can enhance balance for children diagnosed with cerebral palsy.

Conclusion

Combined results from studies investigating sports orthoses suggest that these devices are unlikely to compromise balance when used as a prophylactic measure in normal populations. When used as a means of preventing further injury in populations with ankle instability they may even offer positive effects on various balance related outcome measures. Results of studies investigating ambulatory AFOs provide some evidence to suggest that balance outcomes are dependent on the specific design of the device. While rigid designs appear to be beneficial in static balance tasks, more flexible designs appear to be superior under dynamic balance conditions.

Reference/literatura

1. Hafner B. State-of-the-science evidence report guidelines. Washington: American academy of orthotists and prosthetists; 2008. Dostopno na: https://cdn.ymaws.com/www.oandp.org/resource/resmgr/docs/pdfs/aaop_evidencereportguidelines.pdf (citirano 6. 2. 2019).