

Virgni sternocleidomastoid vöðva í tveimur þungaberandi stöðum

ABSTRACT

Work-related neck and upper limb disorders (WRUNLD) are a negative factor of increased computer use. Neck pain has been associated with neck and head posture but according to the literature the outcome is conflicting. The purpose of this study was to investigate the muscular activity in the sternocleidomastoid (SCM) muscles during sitting in two different cranio-cervical postures (CCP's) in a standard computer environment using electromyography (EMG). The muscular activity was measured during 5 minutes period, twice with the head held in a resting posture (RHP) and once after being placed, by the author, in a neutral head posture (NHP) as defined by Kendall et al. (2005). Linear excursion measurement device (LEMD) was used to determine the differences between the resting and neutral head postures. Twenty-four students from the University of Birmingham (aged 19-31) responded to an e-mail request for volunteers and fulfilled the inclusion criteria. The study was single-blinded, two-tailed, using the same subject design with A-A-B repeated measurements where A- represents the resting and B- the neutral head posture. The participants attended a laboratory room for measurements where the total procedure time was approximately 30 minutes. Root-mean-square (RMS) values over one minute of the EMG signals were calculated for data analysis. The paired t-test was used for statistical analysis using SPSS (version 15). The results showed no significant



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difference ($P=0.08$) in muscular activity in the sternocleidomastoid muscles when sitting with the head in resting or neutral head postures. The LEMD outcome showed that the participants' resting head postures deviated significantly ($P<0.001$) from the neutral head posture. The findings suggest increased activity in the SCM muscles in the neutral head posture compared with the resting one. It also shows that neutral head posture is unfamiliar among young individuals working on computers.

INNGANGUR

Óþægindi frá stöðkerfinu eru algeng hjá einstaklingum sem vinna við tölvur. ^{24,48,49,55,56} Rannsóknir hafa sýnt fram á að bæði vinnustellingar og vinnuumhverfi geta verið undirliggjandi þættir í þróun einkenna fyrir háls- og herðasvæði. ^{1,7,24,25,28,40,48,49,50,56} Aðferðir til að mæla virgni hálsvöðva eru ólíkar ⁵⁴ sem og aðferðir við mælingar á höfuð-hálsstöðu (cranio-cervical posture) þannig að samanburður er oft erfiður á milli rannsókna. ^{29,41} Sú aðferð sem mest

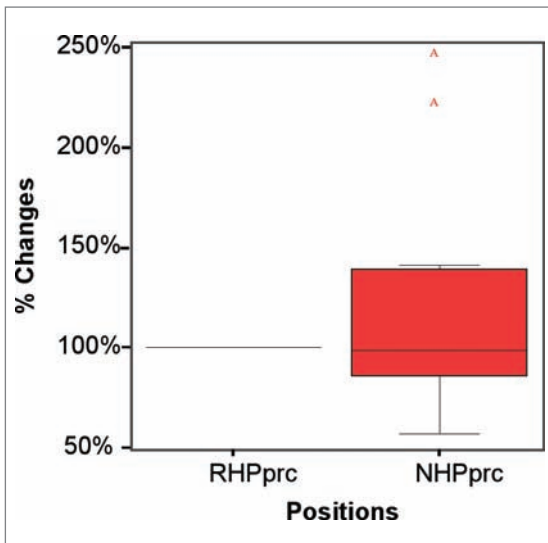
hefur verið notuð til mælingar á virkni beygjuvöðva háls er „höfuð-háls beygju prófið“ (cranio-cervical flexion test) með aðstoð vöðvarafrits (EMG). ^{4,16,17,31,33,34,42,52,57} „Höfuð-háls beygju prófið“ mælir hins vegar ekki virkni hálsvöðva í þungaberandi stöðu við starfræna færni. Sama má segja um mælingar á höfuð-háls stöðu sem enn hafa ekki verið staðlaðar fyrir þungaberandi stöðu. Fáar rannsóknir hafa mælt virkni beygjuvöðva háls í þungaberandi stöðu og engin „randomized controlled trials“ (RCT) (slembuð samanburðarrannsókn) hefur verið birt. Enn hefur ekki verið fundin sönnun fyrir sambandi milli höfuð-hálsstöðu og hreyfistjórnunarkerfisins (motor control). ⁴⁹ Rannsóknir hafa sýnt mismunandi niðurstöður varðandi hlutverk höfuð-hálsstöðu við verkjavandamál í hálsi og herðum. ^{29,41}

M. sternocleidomastoid hefur lítið verið rannsakaður í mismunandi höfuð-hálsstöðum í þungaberandi stöðu. Hlutverk m. sternocleidomastoid er tvíþætt, réttir (neck extensor) í atlanto-occipital lið en beygir (neck flexor) í neðri hluta hálsins. ^{8,18,26}

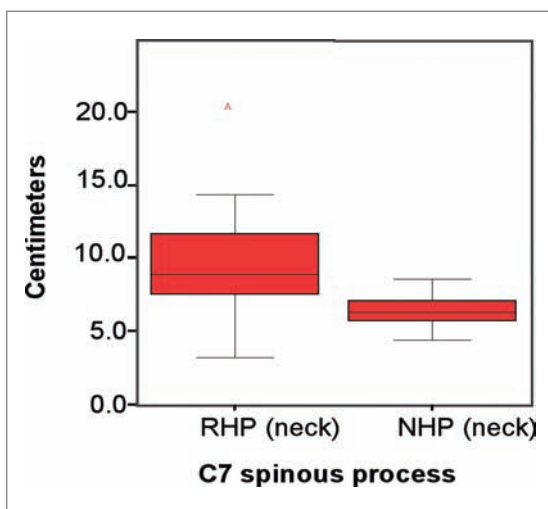
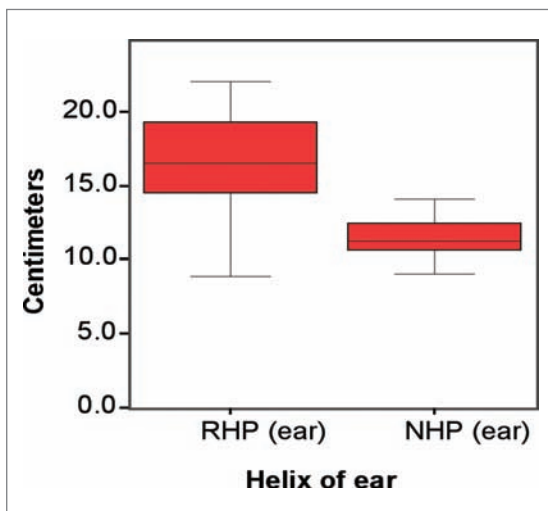
Tilgangur rannsóknarinnar var að mæla virkni í m. sternocleidomastoid hjá þátttakendum í sitjandi stöðu með höfuð í hvíldarstöðu (resting head posture) og í miðstöðu (neutral head posture).

AÐFERÐ OG RANNSÓKNARSNÍÐ

Rannsóknin var einblind (single blinded) þar sem þátttakendur vissu að hluta til ekki um framkvæmd rannsóknarinnar. A-A-B rannsóknarsnið



MYND 6. HLUTFALLSLEG PRÓSENTUBREYTING VÖÐVARAFRITS (sEMG) Í STERNOCLEIDOMASTOID VÖÐVA MILLI HVÍLDARSTÖÐU OG MIÐSTÖÐU. KASSAREITUR (BOX PLOT) SÝNIR LÁGMARKSGILDI, 25% HLUTA, MIÐGILDI, 75% HLUTA OG HÁMARKSGILDI. LÁRÉTTA LÍNAN SÝNIR MIÐGILDIÐ. □SÝNIR ÚTLAGA.



MYND 7. FRÁVIKSSTAÐA Á HÖFUÐ-HÁLSSTÖÐU. KASSAREITUR (BOX PLOT) ÚTSKÝRIR LÁGMARKSGILDI, 25% HLUTA, MIÐGILDIÐ, 75% HLUTA OG HÁMARKSGILDI Í HVÍLDARSTÖÐU OG MIÐSTÖÐU. □SÝNIR ÚTLAGA.

95 % öryggismörk

% Gildi	Meðaltal	SEM	Lægri	Efri	t-gildi	df	sig (two tailed)
Hvíld vs. mið	18.21	9.9	-2.35	38.8	1.832	23	0.08

TAFLA 1. HLUTFALLSLEG GILDI VÖÐVARAFRITS (sEMG), MEÐALTAL, STAÐALFRÁVIK FRÁ MEÐALTALI (SEM), 95% ÖRYGGISMÖRK (95% CONFIDENCE VALUES), T-GILDI (T-VALUE), SVIGRÚMSSTIG (DF) OG P-GILDI (P-VALUE).

95% öryggismörk

% Gildi	Meðaltal	SEM	Lægri	Efri	t-gildi	df	sig (two tailed)
Hvíld vs. mið	2.04	0.19	1.65	2.42	10.88	23	0.00

TAFLA 2. HLUTFALLSLEG FRÁVIKSGILDI (LEMD) Á HÖFUÐ-HÁLSSTÖÐU, MEÐALTAL, STAÐALFRÁVIK FRÁ MEÐALTALI (SEM), 95% ÖRYGGISMÖRK (95% CONFIDENCE VALUES), T-GILDI (T-VALUE), SVIGRÚMSSTIG (DF) OG P-GILDI (P-VALUE).

Niðurstöður rannsóknarinnar sýndu að það var ekki marktækur munur ($P=0.08$) á vöðvarafriti (sEMG) í sternocleidomastoid vöðva milli hvíldar- og miðstöðu. Við 95% öryggismörk var breytingin í vöðvavirkni frá -2.0 upp í 38%. Meðaltalsbreyting var 18.21 % (SEM=9.94). Niðurstöður gefa vísbendingu um veikt vöðvarafritsmerki (sEMG signal) í rannsókninni.

Frávíksútkoman (LEMD) sýndi að þátttakendur í hvíldarstöðu voru marktækt ($P<0.001$) með aukna framstöðu (forward head tilt) miðað við miðstöðu.

UMRÆÐUR

Það var veik virkni í sternocleidomastoid vöðvum í bæði hvíldar- og miðstöðu sem gefur vísbendingu um lítið stöðugleikahlutverk vöðvans í kyrrstöðu í stuttan tíma. Það eru vísbendingar um að með stærra úrtaki hefði verið hægt að sýna fram á aukna virkni í sternocleidomastoid vöðva í miðstöðu. Miðstaða virðist vera óvenjuleg höfuð-hálsstaða fyrir marga einstaklinga sem vinna í tölvuumhverfi en litla virkni í sternocleidomastoid vöðva má útskýra meðal annars vegna samspennu (co-contraction) hálsvöðva. Breytingar í lengdar-spennu sambandi (length-tension relationship) hefur áhrif á sternocleidomastoid vöðva⁵⁷ en það eru vísbendingar um að í hvíldarstöðu vinni sternocleidomastoid vöðvinn í miðferli, í réttri og þægilegri vöðvalengd og sýni litla virkni. Í miðstöðu hins vegar færast lengdarásinn (longitudinal axis) aftar. Við lengdar-spennu breytinguna örvast vöðvaspólur og golvikerfið³⁹ sem hefur áhrif á aukna virkni í sternocleidomastoid vöðva. Enn frekar getur miðstaða haft áhrif á aukna virkni í djúpu háls beygjuvöðvum, örvað gagnvirka slökun í réttivöðvum í hálsi og þar með gert sternocleidomastoid vöðvan að aðal réttivöðvanum (extensor) í atlanto-occipital lið.^{6,26}

Niðurstöður rannsóknarinnar gefa vísbendingu um svipaðar niðurstöður og fyrri rannsóknir sem hafa mælt virkni í aftari hluta hálsvöðvum í þungaberandi stöðu þar sem sýnt hefur verið fram á að við litlar breytingar í höfuð-hálsstöðu verði aukið álag á stöðugleikapáttum hálsins og þar með talið virkni í hálsvöðvum.^{10,20,24,47,48,49,50,55}

Megin útskýring á frávíksútkomu í höfuð-hálsstöðu var að þátttakendum var leiðbeint inn í miðstöðu af rannsakanda (alltaf sami rannsakandi) en þátttakendur völdu sína eigin hvíldarstöðu. Niðurstöður eru í samræmi við fyrri rannsóknir á höfuð-hálsstöðu.^{21,22,23,29,45}

Ályktun

Megin niðurstöður rannsóknarinnar gefa til kynna að það sé lítil virkni í sternocleidomastoid vöðva í tveimur ólíkum höfuð-hálsstöðum meðal heilbrigðra einstaklinga sitjandi við tölvu. Niðurstöður rannsóknarinnar geta verið hjálplegar meðferðaaðilum sem meðhöndla skjólstæðinga út frá bestu fánlegum rannsóknum (evidence based) þar sem fræðsla um líkamsstöðu er hluti af endurhæfingarmeðferð. Miðstaða er ókunnug mörgum einstaklingum sem vinna í tölvuumhverfi og á einungis að nota sem „útgangspunkt“ því að miðstaða getur aukið virkni í hálsvöðvum, haft áhrif á vöðvaþreytu og aukið álag á háls- og herðasvæði. Frekari rannsóknar er þörf á fremri hluta hálsvöðva í þungaberandi stöðu þar sem fleiri þættir höfuð-hálsstöðu eru rannsakadír með stærra úrtaki og þátttakendum með og án einkenna frá háls- og herðasvæði.

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