



HOKKAIDO UNIVERSITY

Title	The effect of Oropharyngeal Exercises/Myofunctional Therapy on Orofacial Function and Corticomotor Excitability in healthy individuals : Exploring the possibility of the treatment use for Obstructive Sleep Apnea [an abstract of dissertation and a summary of dissertation review]
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学 位 論 文 題 名

The effect of Oropharyngeal Exercises / Myofunctional Therapy on Orofacial Function and
Corticomotor Excitability in healthy individuals

- Exploring the possibility of the treatment use for Obstructive Sleep Apnea -

（口咽頭運動/筋機能療法が口腔顔面機能および皮質運動興奮性に与える影響
－ 閉塞性睡眠時無呼吸症治療応用可能性の探求 －）

キーワード（５つ） Myofunctional therapy, oropharyngeal exercise, obstructive sleep apnea, corticomotor excitability, transcranial magnetic stimulation

Oropharyngeal exercises / myofunctional therapy (OE/MT) may be a promising treatment of obstructive sleep apnea (OSA). However, the complex nature of the intervention impedes the understanding of underlying mechanisms related to sensorimotor function and corticomotor control of involved muscles. This study aimed to investigate aspects of oropharyngeal function and corticomotor excitability of the tongue before and after different OE/MT in healthy humans to understand normal physiology better. Twenty-two healthy adults (mean age 24.1 ± 3.1 years) participated in a cross-over design comprising three sessions, with a one-week minimum between sessions to avoid carry-over effects. Each session involved one of three training tasks: breathing training (BT), tongue training (TT), or a control task with no training (CT) in randomized order. Transcranial magnetic stimulation (TMS) was conducted before and immediately after each session to evaluate the impact of the interventions on motor evoked potential (MEP) of the tongue and first dorsal interosseous (FDI – internal control) muscles. Various assessments of orofacial muscular pressure/force, peak expiratory flow rate (PEFR), and oral stereognosis were also conducted. Participants reported motivation, fun, pain, fatigue, and difficulty on 0–100 numerical rating scales (NRS) before and after every session. TT was

associated with a significant increase in the tongue MEP amplitude ($P < 0.001$), in contrast to BT and CT ($P > 0.050$). The volume of the tongue MEPs also increased following TT ($P < 0.001$), but not following BT or CT ($P > 0.050$). FDI MEPs were not significantly affected by any task ($P > 0.050$). No significant differences were observed in orofacial muscular pressure, PEFR, oral stereognosis, or NRS scores among the tasks ($P > 0.050$). The present study offers additional support for the potential therapeutic mechanisms of OE/MT by the demonstration that TT can elicit a unique corticomotor excitability change associated with tongue motor control. BT may need further development and be tested for a longer period before functional effects can be observed.