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Original Article

Effects of an oral-pharyngeal motor training programme on children with obstructive sleep apnea syndrome in Hong Kong: A retrospective pilot study

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Tongue strength

Summary *Background:* This study aimed to investigate the effects of an oropharyngeal motor training programme on children with Obstructive Sleep Apnea Syndrome (OSAS) in Hong Kong.
Methods: In this retrospective study, we reviewed the outcomes of 10 children with OSAS who had received an oropharyngeal motor training programme in Occupational Therapy Department of an acute hospital in Hong Kong over a 1-year programme. Each participant attended an individual oropharyngeal motor training programme plus a follow-up session after 2 months. The training programme consisted of 10 individual mobilization exercises involving the orofacial and pharyngeal area for 45 minutes. Each exercise had to be repeated for 10 times. Three outcome measures were chosen to study the effectiveness of the training programme including tongue strength, tongue endurance level and orofacial function. Tongue strength and tongue endurance level were assessed using the Iowa Oral Pressure Instrument (IOPI). The Nordic Orofacial Test-Screening (NOT-S) Assessment was used to assess the orofacial function. Seven out of 10 participants completed the training programme and attended the follow-up session after two months.
Results: The tongue strength and the scores of NOT-S of the 7 participants were found to have significant improvement after training. However, there was no significant difference in tongue endurance level.

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Conclusion: The findings of this study support the role of occupational therapist in oromotor training modalities to improve the respiratory function for children with OSAS in Hong Kong.

Introduction

Current traditional management of obstructive sleep apnea syndrome (OSAS) includes non-invasive ventilation, e.g. Continuous Positive Airway Pressure Therapy (CPAP), surgical treatment e.g. adenotonsillectomy and tongue suspension, and non-surgical treatment e.g. the use of oral appliance (An & Ranson, 2011; Capdevila, Kheirandish-Gozal, Dayyat & Gozal, 2008; Rosen, 2004).

Recent evidences revealed that the orofacial developmental disorders in children with OSAS may be caused by orofacial anatomic abnormalities which result in upper airway obstruction, these abnormalities included high arch palate, hypotonic tongue and lips muscles (Clark, O'Brien, Calleja, & Corrie, 2009; Guimarães, Drager, Genta, Marcondes, & Lorenzi-Filho, 2009; Huang & Guilleminault, 2013). Findings of several studies have indicated that oropharyngeal motor training programme could be useful to improve the muscle tone of the tongue, throat, and face, which could increase the anatomical space of the orofacial structures and hence, reduce obstruction to the airway (Huang & Guilleminault, 2013; Leme, Barbosa, & Gavião, 2012; Logemann, 2008; Potter & Short, 2009; Randerath, Galetke, Domanski, Weitkunat, & Ruhle, 2004; Varjão, 2012).

An oropharyngeal motor training programme has been used by a group of occupational therapists in Taiwan to reduce obstructive sleep apnea and symptoms of sleep disordered breathing in children such as snoring and mouth breathing (Huang & Guilleminault, 2013). This pilot study adopted the oropharyngeal motor training programme from Taiwan (Huang & Guilleminault, 2013) to be used in Hong Kong for children with OSAS. This case study aimed to investigate retrospectively the effects of this oropharyngeal motor training programme for children with OSAS in Hong Kong.

Methods

Participants

Ten children, aged 6-18 years, diagnosed with OSAS, were referred from the Paediatric Sleep Clinic to Occupational Therapy Department for oropharyngeal motor training in an acute hospital in Hong Kong. Data of this study was collected over one year from January to December 2014. Participants had received oropharyngeal motor training during the above period. All participants had their pre-training Apnea—hypopnea Index (AHI) greater than 1.0 as confirmed by the Polysomnography (PSG).

Procedure

An occupational therapist in the hospital, who had received prior training in this area, provided an individual session of the oropharyngeal motor training programme to all the participants. The training aimed to correct the improper function of the tongue and facial muscles. This training was a re-education training in order to strengthen the tongue and oral-facial muscles by teaching individuals on how to reposition muscles to the appropriate position. Assessments were conducted at two time points: (a) before training, and (b) 2 months post-training.

The training programme consisted of 10 individual mobilization exercises involving orofacial and pharyngeal area that required 45 minutes to complete. Each exercise had to be repeated for 10 times. The 10 exercises were:

Exercise 1: Pushing Up The Tongue
Exercise 2: Touching Nose
Exercise 3: Touching Chin
Exercise 4: Pushing Tongue Right and Left
Exercise 5: Folding Tongue
Exercise 6: Clicking the Tongue
Exercise 7: Pushing Tongue Against Spoon
Exercise 8: Holding A Spoon
Exercise 9: Holding Button with Lips
Exercise 10: Gargling

During the training session, the Occupational Therapist went through all the exercise items with participants and an instruction sheet was provided to them for home programme. A daily time log was also given to each participant to record their compliance to the home programme. Each participant was then followed up in two months' time.

Outcome measures

In order to study the effectiveness of the oropharyngeal motor training programme, three outcome parameters were chosen: orofacial function, tongue strength and tongue endurance level. The orofacial function of the participants was assessed by the Nordic Orofacial Test-Screening (NOT-S) Assessment (Leme et al., 2012), while the tongue strength and tongue endurance level were assessed using the Iowa Oral Pressure Instrument (IOPI) (Potter & Short, 2009). They were conducted by a trained occupational therapist.

Nordic Orofacial Test-Screening (NOT-S) Assessment

The NOT-S assessment was used for patients aged 3 years or above who had difficulties to speak, chew or swallow. It was developed by the Mun-H-Center in Sweden with a total score of 12 (Leme et al., 2012). It includes two parts, the NOT-S interview session and the NOT-S examination session. The NOT-S interview consists of six sections: sensory function, breathing, habits, chewing and swallowing, drooling, and dryness of the mouth. The NOT-S examination consists