

Home-based App for Oral Muscle Exercises (HOE): A Preliminary Study

Rosalind Sin Man Chan ^a, Tian Yu Zhou ^a, Ying Liu ^a, Hiu Tung Tsang ^a, Chun Lam Luk ^a, Tsz Hei Chan ^a,
Walter Yu Hang Lam ^b, Winsy Wing Sze Wong ^c, James K.H. Tsoi ^a

^a *Division of Applied Oral Sciences and Community Dental Care, Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR, PR China*

^b *Prosthodontics, Division of Restorative Dental Sciences, Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR, PR China*

^c *Department of Chinese and Bilingual Studies, Faculty of Humanities, The Hong Kong Polytechnic University, Hong Kong SAR, PR China*

Objectives

Maintenance of oral muscle functions is particularly important to the elderly. This project aims to explore the usability of a mobile app with feedback features to improve oral biomechanical functions of elderly.

Materials and Method

A total of 106 neurologically healthy Hong Kong citizens over the age of 50 years and possessed at least one pair of natural occluding molars were recruited in this non-randomised controlled study from June to October 2022 (IRB UW21-324). Their occlusal force and masticatory efficiency were measured by occlusal pressure measurement film (Dental Prescale II, GC Corp) and Gluco sensor (GS-II, GC Corp), respectively, while their maximum tongue pressure and endurance were assessed using the Tongue pressure sensor (TPM-02, JMS) one and four weeks before training as baselines. Assessments after one week and 8-week post-training were conducted to reflect the performance on immediate post-training and at maintenance phase. A set of 12 self-administered oral exercises of the tongue, lips and jaw were conducted with guidance provided in an app installed in the participants' mobile phones, in which visuo-audio demonstrations and immediate feedback on facial movements by tree-based face landmark detector were given to the user. Mixed effects models were used to compare the pre/post performance on various oral functions analyzed with Jamovi software (v2.3) at $\alpha=0.05$.

Results

Based on 27 participants who completed the study by January 2023 (Figure 1), it is revealed that the occlusal force, masticatory efficiency, maximum tongue pressure, and tongue endurance were significantly increased at post-training phase, among which the maximum tongue pressure and tongue endurance further increased were shown at maintenance phase.

Conclusion

The preliminary results suggested that oral exercises delivered by the HOE app may be easy and effective strategy in strengthening the oral muscles and improving oral biomechanics of the elderly.

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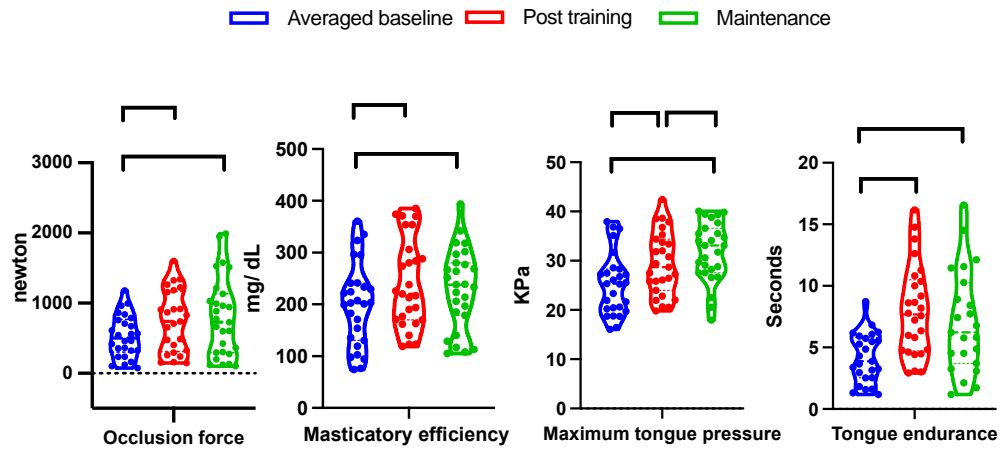


Figure 1. Comparisons before and after oral exercise training. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$