AN ADAPTIVE AUDITORY-COGNITIVE TRAINING SYSTEM AS A MODERATOR FOR BRAIN PLASTICITY IN OLDER ADULTS WITH NORMAL AND WITH NEURO-COGNITIVE IMPAIRMENT

Yusmeera Yusof[1], Siti Zamratol-Mai Sarah Mukari[5], Mariam Adawiah Dzulkifli[3], Kalaivani Chellapan[5], Kartini Ahmad[2], Nashrah Maamor[2], Wan Syafira Ishak[2]

[1]The Ministry of Health, Putrajaya, Malaysia
[2]Faculty of Health Sciences, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia
[3]The International Islamic University of Malaysia, Kuala Lumpur, Malaysia
[4]Institute of Ear, Hearing and Speech, Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia
[5]Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, Selangor, Malaysia.

ABSTRACT

Introduction: This study aimed to evaluate the effects of a newly developed auditory cognitive training system on speech recognition, central auditory processing and cognition among older adults with normal and with neuro-cognitive impairment. The auditory-cognitive training is a web-based interactive system, developed by Universiti Kebangsaan Malaysia in 2017, which focuses on training speech perception in noise and auditory working memory which included cognitive interferences.

Methods: A randomised controlled trial was conducted on two groups of older adults aged 60 years or above; one group with normal cognition (n=45: 23 treatment and 20 active control) and another group with impaired cognition (n=33: 17 treatment and 16 active control). Subjects in the treatment group underwent auditory-cognitive training (3 times/ week, for 8 consecutive weeks), whereas the control group were assigned to watch documentary videos program for the same frequency and duration. Study outcomes which included Montreal Cognitive Assessment (MoCA), Malay Hearing in Noise Test (MyHint), Dichotic Digit Test (DDT), Gaps in Noise Test (GIN) and Pitch Pattern Sequence Test (PPST) were measured at baseline, week 4, week 8 and week 12.

Results: A repeated measure analysis of variance (ANOVA) revealed significant training effects in speech recognition in quiet, DDT, GIN, PPST (humming) and MoCA p's (<0.0001 to < 0.05 partial η^2 (0.125 – 0.327) among the normal cognitive group. In the impaired cognitive group, treatment effects were observed only in DDT ($p < 0.001$, partial $\eta^2 = 0.139$) and MoCA ($p < 0.0001$, partial $\eta^2 = 0.495$. The training-related improvements were sustained up to four weeks after the training end.

Conclusion: The newly developed auditory-cognitive training system (UKM™) has a potential to be used in auditory rehabilitation of older adults with normal and with neuro-cognitive impairment.

KEYWORDS: Older. adults, Training, Auditory-cognitive, Working memory, Cognitive interference

Corresponding author: Siti Zamratol-Mai Sarah Mukari (zamratol@ukm.edu.my)