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Preliminary study on innovative virtual reality exercise for pulmonary rehabilitation among stable patients with chronic obstructive pulmonary disease

Abstract:

Virtual reality (VR) is a new innovative technology that can enhance pulmonary rehabilitation (PR) in physical therapy (PT). The software with three exercise components of chest mobilization and deep breathing, upper and lower limb exercise, and relaxation exercise is challenged clinically among patients with chronic obstructive pulmonary disease (COPD). Therefore, the clinical effect of exercises with VR was studied among stable COPD participants ($n = 10$) compared to non-VR participants ($n = 10$). Clinical outcomes: sit-and-reach distance, lung capacity (VC) (forced vital capacity; FVC and forced expiratory at one second; FEV1), chest wall expansion (CWE), and dyspnea score were assessed before and after 14 days. In addition, the usability, satisfaction, and health safety of the VR were interviewed. The results between non-VR exercise (aged 56.80 ± 10.52 years) and VR exercise groups (aged 64.70 ± 10.33 years) showed significant differences between groups in the sit-and-reach distance, CWE, or dyspnea score, except for the VC. When comparing within groups, the VR exercise group significantly changed on FVC, sit-and-reach distance, CWE, and dyspnea scores as well as in the non-VR exercise group showed significant differences in FVC, sit-and-reach distance, and dyspnea score, except FEV1 and CWE. When statistically comparing the results of the post-exercise period between groups, the sit-and-reach distance, CWE, and dyspnea were improved in the VR exercise group significantly when compared to the non-VR exercise group. Ultimately, COPD participants accepted the usability and satisfaction on exercise with VR without side effects on health.

Conclusion: This study demonstrates that innovative VR can be applied via specific exercise programs in pulmonary rehabilitation for physical therapy.

Biography

Jirakrit Leelarungayub has completed his Bachelor program in Physical Therapy from Khon Kaen University, Master of Science in Data Science and Digital Innovation, and Ph.D. in Biochemistry in Thailand. He has been an Associate Professor in the Cardiopulmonary Physical Therapy Field at the Faculty of Associated Medical Science, Chiang Mai University, Thailand since 1994. He has published more than 64 papers in reputed journals and has been serving as an editorial board member of repute.