ABSTRACT

**Title:** The effects of a TTM-based Exercise Stage-Matched Intervention (ESMI) on patients with coronary heart disease

**Background:** Coronary heart disease (CHD) is a leading cause of death and disability among adults worldwide. Regular exercise or exercise-based cardiac rehabilitation has been shown to be beneficial to cardiac patients; however, participation and adherence to exercise programmes is poor. The Transtheoretical Model (TTM) has been demonstrated to be a successful model for changing exercise behaviour in various populations from adolescents to the elderly. However, there have been few studies on the use of the TTM for changing exercise behaviour among CHD patients.

**Aim:** To examine the effects of a TTM-based Exercise Stage-Matched Intervention (ESMI) on sedentary patients with CHD. The primary outcome indicator is change in exercise behaviour. The secondary outcome indicators are anginal attacks and quality of life.

**Methods:** This study involved a randomized controlled trial using consecutive sampling. A total of 196 subjects were recruited and randomly assigned to one of the following three groups: the Conventional (C) Group (n = 67), the Patient Education (PE) Group (n = 64), and the ESMI Group (n = 65). Outcome measures included exercise stages of change, exercise self-efficacy, exercise decisional balance, exercise duration per week, conditions of angina, and quality of life. Data collection was carried out at baseline (T₀), post-intervention (T₁), at the 3-month follow-up period
Data analysis was conducted based on the intention-to-treat principle. Last observation carried forward (LOCF) was employed to handle the missing data. One-way ANOVA, the Kruskal-Wallis test, and Chi-square test were applied to analyze data among the three groups at each time point. One-way repeated ANOVA, the Friedman test, and Cochran's Q test were used to analyze data within groups over time.

**Results:** A total of 150 subjects completed the whole study. The findings showed that significantly positive effects on changes in exercise behaviour were found in the ESMI group, in terms of a more positive shift in the exercise stages of change \((p < 0.001)\), higher exercise self-efficacy \((p < 0.001)\), greater exercise benefits \((p < 0.001)\), fewer exercise barriers \((p < 0.001)\), longer total exercise duration (minutes/week) \((p < 0.001)\), and longer moderate exercise duration (minutes/week) \((p < 0.001)\), after the completion of the 8-week ESMI when compared with the C and PE groups. With regard to anginal attacks, no significant differences in frequency, severity, and duration of anginal attacks were found among the three groups at each time point. The ESMI group demonstrated significantly better quality of life, in terms of improvements in physical limitation \((p < 0.01)\), treatment satisfaction \((p < 0.001)\), and disease perception \((p < 0.001)\) of Seattle Angina Questionnaire (SAQ), and in physical component summary \((p < 0.01)\), mental component summary \((p < 0.001)\), and reported health transition \((p < 0.05)\) of SF-36 after the completion of the 8-week ESMI when compared with the C and PE groups. These significantly positive effects were maintained at the 3- and 6-month follow-up periods, with the exception of those for total exercise duration (minutes/week) and reported health transition, which had disappeared at the 6-month follow-up period.
**Conclusion:** The TTM-based ESMI has significantly positive effects on changes in exercise behaviour and quality of life in sedentary CHD patients. The findings highlight the feasibility and importance of providing CHD patients with a structured or formal patient education programme guided by the TTM.