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The Effects of 12 Weeks YMCA Health Promotion Course Intervention on Senior Functional Fitness

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Abstract. This study explores the impact of the 12 week YMCA health promotion course on functional fitness in the elderly. A total of 66 elder participants of the community care center were recruited to participate in experimental and control groups in this study. The interventional groups performed 12 weeks of YMCA health promotion courses (cognitive, oral motor, resistance, and interactive exercises). The experimental group enhanced upper and low limbs muscle endurance, upper limb flexibility, aerobic fitness, reactive time, and oral functions. This study confirms that YMCA health promotion courses can effectively improve the functional fitness of the elderly.

Keywords: cognitive exercise, oral motor exercise, resistance exercise, interactive exercise.

INTRODUCTION

According to the Ministry of the Interior of Taiwan as of the end of March 2018, the population over 65 was 14 %. It shows that Taiwan has officially entered an aging society. The National Development Commission estimated Taiwan would enter into a super-aging community in which the elderly population will exceed 20 %. Thus, dealing with the questions (falling, the decline in physical functions, or loss of the ability to live independently) of the aging population has become an important issue facing the government [1,2].

The senior fitness test (SFT) is a method to evaluate the elder's physical ability in their daily life. SFT is currently commonly used in various countries to assess the functional fitness of older people. The reliability and validity of SFT were confirmed and widely used in various types of older adults living in the community [3]. The factors of SFT include body composition, muscle strength and endurance, cardiorespiratory fitness, flexibility, agility, and balance ability [3]. SFT was designed to be closely related to daily activities, such as housework, dressing, walking, shopping, sports, and others. Especially for the elderly living in the community, functional fitness is crucial. Older adults with better functional physical fitness can solve the problems in daily life on their own and do not need to rely on others to cause a burden.

The course design of the YMCA health promotion course is to activate the cognitive, oral function, and physical fitness. Cognitive function is related to dementia disease. Oral motor functions are related to the eating capacity of the elderly. Strengthening the masticatory muscles and enhancing the swallowing effect can also prevent aspiration pneumonia and promote saliva secretion. Muscle strength training is the essential part of anti-fall exercises. Cardiopulmonary training maintains the metabolism and the performance of the cardiopulmonary function, which is related to the metabolic process, and the recovery after workouts. The interaction exercise uses actives or games to encourage elders to communicate with each other. The purpose of relieving the tense atmosphere is to create a comfortable atmosphere to get along with others and promote health promotion courses [4].

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Based on the above summary, YMCA health promotion courses are designed to promote cognitive, oral motor, cardiopulmonary, muscular fitness, and interactive group relationship. therefore, this study explores the impact of the 12 weeks YMCA health promotion course intervention on functional fitness in the elderly. The specific objectives of this research are as follows.

(1) YMCA health promotion course significantly enhances the cognitive function of the community care center elderly.
(2) YMCA health promotion course significantly enhances the oral cavity function of the community care center elderly.
(3) YMCA health promotion course significantly enhances the senior functional fitness of the community care center elderly.
(4) YMCA health promotion course significantly enhances the interactive social relationship of the community care center elderly.

RESEARCH METHODS

Research Participants

This study recruited 66 elders in the Taiwan community care center by purposive sampling. The recruited criteria were 65 years of age and above with non-cognitive impairment who communicated in Chinese or Taiwanese, followed the exercise instructions, and walked without assistance (contain assistive devices). The 66 participants were arranged into experimental (n=) or control groups (n=). The participants of experimental groups accepted 12 weeks of YMCA health promotion courses, and control groups maintained their regular daily life from August 22, 2019, to May 28, 2020.

Research Tools

Cognitive Function

This study is to understand the cognitive function of older adults. The researcher used the reaction time of hand-eye coordination as the indicator of cognitive function in this study.

Oral Cavity Function

In this study, we used a simple swallowing dysphagia test by count the number of times swallowed saliva [5]. An oral diadochokinesis test (Pa, Ta, Ka, and La) was used to evaluate the functions of the lips, velar consonant, and tongue [6].

Senior Functional Test (SFT)

The SFT of this study includes 30-s chair stand test (muscle strength of the lower limbs), 30-s arm curl test (the upper limb muscle strength and endurance), chair sit-and-reach test (flexibility of the lower limbs), back scratch test (flexibility of the upper limbs), 8-foot up and go test (balance and agility), 2-minute step test (cardiopulmonary function) [3].

Interactive Social Relationship

The interactive social relationship of the elderly in this study was evaluated by the self-conscious physical and mental health scale (SCPMHS), which was constructed by Lee *et al*. (2010) [7]. The SCPMHS was divided into three factors with 16 items: mental, physical, and social. There were a total of 6 items in mental health, five items in physical health, and 5 items on social health. The social health section is used as a criterion for the evaluation of interactive social relationships of the elderly. The scoring method was 5 points Likert scale.

Data Processing and Analysis

The obtained data is sorted and analyzed with the computer statistical package software SPSS18.0 version. An independent sample *t*-test was used to compare the differences between before and after interventions on the cognitive, oral motor, senior functional fitness, and interaction social relationship. The significant level was α=0.05.

RESULTS

Basic Parameters of Elderly Participants

The experimental group participants are six males (18.2 %) and 27 females (81.8 %) of 81.42±6.54 years. Their average height was 152.3±5.71 cm, and their average weight was 59.62±11.97 kg. The control group participants were 11 males (33.3 %) and 22 females (66.7 %) of 71.88±9.25 years. Their average height was 156.64±6.92 cm, and Their average weight was 62.81±7.98 kg. There were no significant differences in basic parameters between experimental and control groups.

This study analyzed the difference between the before and after the experimental and control groups and compared the differences between the two groups using the independent sample *t*-test. The study found that the EG group was improved significantly for the 30-s chair stand test, 30-s arm, the performance of curl test, 2-minute step test, back scratch test, chair sit-and-reach test, and hand-eye coordination test (Table I). Also, in the oral cavity function part, EG had better performance on the Diadochokinesis test (Pa, Ta, Ka, La) than CG (Table II). In the part of the SCPMHS scale, after twelve weeks of YMCA health promotion courses, EG had significant changes in mental health, but not at the physical and social health (Table III).

TABLE I. Independent Sample T-Test Of Senior Functional Fitness And Cognitive Response

Category	Group	M	SD	*t*	*p*
30-s chair stand test (times)	EG	0.85	1.94	4.18*	0.00
	CG	-1.76	3.01		
30-s arm curl test (times)	EG	1.09	2.93	3.33*	0.00
	CG	-2.64	5.73		
2-minute step test (times)	EG	4.82	11.13	2.66*	0.01
	CG	-2.03	9.75		
Back scratch test (cm)	EG	3.89	9.40	2.51*	0.01
	CG	-1.12	6.56		
chair sit-and-reach test (cm)	EG	0.79	6.94	5.82*	0.00
	CG	-8.29	5.68		
8-foot up and go test (s)	EG	0.17	3.14	-0.067	0.95
	CG	0.21	1.73		
Hand-eye coordination test (cm)	EG	-2.47	9.55	-5.11*	0.00
	CG	10.97	11.71		

*$p < .05$

TABLE II. The Independent Sample T-Test Of Oral Cavity Functions

Category	Group	M	SD	*t*	*p*
Diadochokinesis test (Pa)	EG	0.23	0.34	2.94*	0.01
	CG	-0.03	0.37		
Diadochokinesis test (Ta)	EG	0.25	0.30	2.09*	0.04
	CG	0.05	0.43		
Diadochokinesis test (Ka)	EG	0.25	0.30	2.89*	0.01
	CG	-0.01	0.43		
Diadochokinesis test (La)	EG	0.30	0.31	3.50*	0.00
	CG	-0.02	0.42		
SDT (1st time/sec)	EG	-0.70	3.75	-0.89	0.38
	CG	0.06	3.14		
SDT (2nd time/sec)	EG	-1.18	6.97	-1.12	0.27
	CG	0.58	5.68		
SDT (3rd time/sec)	EG	0.39	7.58	-0.40	0.69
	CG	1.18	8.30		
SDT (times in 30 s)	EG	0.88	4.01	1.60	0.12
	CG	-0.58	3.35		

*$p < .05$

TABLE III. The Independent Sample T-Test Of SCPMHS

Factor	Group	M	SD	*t*	*p*
Mental health	EG	-0.21	0.66	-2.32*	0.02
	CG	0.15	0.59		
Physical health	EG	0.17	0.51	0.71	0.48
	CG	0.07	0.59		
Social health	EG	0.12	0.28	0.44	0.66
	CG	0.07	0.48		

*$p < 0.05$

DISCUSSION

After the twelve weeks of the YMCA health promotion course, this study found that this course has significantly improved upper limb muscle strength, lower limb muscle strength, and cardiopulmonary endurance in functional physical fitness (exercise) of older adults. This result is similar to the previous study [8]. However, there was no significant improvement in the eight-foot stand-up walking test for the elderly, which is different from the study results. Another study by Cho *et al*. (2017) found that after 24 weeks of lower extremity aerobic training, older adults have significant improvements in their physical function and lower extremity muscle strength, but their balance and walking speed have not improved significantly [9]. Our result is consistent with the findings of this study. The eight-foot stand-up walking test did not have a significant improvement effect. The reason is that the YMCA health promotion course has less agility and dynamic balance training.

In the part of cognitive function, to understand the reaction time of the elderly from the appearance of the stimulus to the beginning of the reaction action [10], the hand-eye coordination test was used to measure the hand-eye coordination test brain performance of older adults. After 12 weeks of YMCA health promotion courses, the EG had significant improvement. Wang and Cai (2009) pointed out that physical activity can help improve the cognitive function of healthy older adults. Physical activity can promote cerebral blood flow in the elderly, increase brain-derived neurotrophic factors, and increase hippocampal gyrus volume and brain microvessel density to prevent or delay the occurrence of dementia in the elderly [11]. As the brain's ability to react is an essential factor in individual functional activities in daily life for the elderly, it is easy to prolong the reaction time due to aging. In sudden accidents, they often fail to respond immediately and cause serious injuries. Therefore, the twelve-four-wheel drive health training course in this study can effectively enhance the brain activation effect of the elderly, that is, increase the brain response-ability.

In the oral cavity function, the verbal pronunciation (Pa, Ta, Ka, and La) in EG elderly has significantly improved. However, the repeated saliva swallowing test (RSST) has not made a significant change, and there are differences with Chen's results [12]. However, there is no substantial change in the repeated saliva swallowing test (RSST). The reason is that the training swallowing motion in the YMCA health promotion course was not t insufficient. According to previous studies, it is necessary to take a longer time to promote oral health [12]. The swallowing and chewing motion need training for improving the oral cavity function of mouse and tongue in the health promotion course.

Finally, in the part of the self-conscious physical and mental health scale (interactive), after the YMCA health promotion course, the social and mental health of the self-conscious physical and mental health scale of the elderly has been significantly improved. Enhancing social support with family, peers, or friends improves the focus of life and peer interaction network, strengthens the interpersonal connection, and strengthens self-consciousness.

The YMCA health promotion course helps seniors improve their senior functional fitness and cognitive eye-to-hand coordination including, increased lower limb muscle strength, upper limb muscle strength, lower limb flexibility, upper limb flexibility, cardiopulmonary function, and brain response. Although there was no significant difference enhanced on saliva swallowing test (RSST), the YMCA health promotion course significantly improved oral function improvement in pronunciation. In terms of conscious physical and mental health, the factor of social health (interpersonal relations, communication, and interaction) is significantly enhanced. The study revealed that the YMCA health promotion could effectively help the senior functional fitness of the elderly.

SUGGESTION AND LIMITATION

This study found that the intervention of the YMCA health promotion course helps the elderly improve their physical fitness and cognitive function. We suggest these courses be extended to different communities in the future. The course's curriculum can be adjusted according to the elderly participants with poor performance. The results show that after the YMCA health promotion course, the intervention had no improvement in oral function in the "repetitive saliva test." We recommend adding swallowing training courses to the course, such as facial movement, mouth movement, tongue movement. Finally, we suggested that interpersonal relationships, social support, happiness, and other scales can be used as the test content to measure in the future.

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