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Enhancing elderly health examination effectiveness by adding physical function evaluations and interventions

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ABSTRACT

This study aimed to assess the benefit of adding physical function evaluations and interventions to routine elderly health examination. This is a Quasi-experimental controlled trial. 404 elderly adults (aged 70 and over) scoring 3–6 on the Canadian Study of Health and Aging Clinical Frailty Scale Chinese In-Person Interview Version (CSHA-CFS) in a 2012 annual elderly health examination were enrolled. Both the control and experimental groups received the routine annual health examination with the latter further provided with functional evaluations, exercise instruction, and nutrition education. 112 (84.8%) persons in the experiment group and 267 (98.2%) in the control group completed the study. CSHA-CFS performance of the experimental group was more likely to improve (odds ratio = 9.50, 95% confidence interval (CI) = 4.62–19.56) and less likely to deteriorate (OR = 0.04, 95% CI = 0.01–0.31) one year after intervention. Within the experimental group, Fried Frailty Index improvement percentage surpassed the deterioration percentage (29.5% vs. 0.9%, $p < 0.001$), five-meter walk speed rose from 1.0 ± 0.2 to 1.2 ± 0.2 m/s ($p < 0.001$), grip strength escalated from 22.3 ± 7.1 to 24.8 ± 6.7 kg ($p < 0.001$), Short-form Physical Performance Battery increased from 10.0 ± 1.6 to 11.6 ± 0.9 ($p < 0.001$), and timed up and go test decreased from 10.9 ± 2.9 to 8.9 ± 2.7 s ($p < 0.001$). However, no statistical difference was detected in composite adverse endpoints, including hospitalization, emergency department visit and falls, between the two groups, though the incidence was higher in the control group. Adding functional evaluations, exercise and nutrition interventions to the annual elderly health examination appeared to benefit the health of adults aged 70 years and older.

1. Introduction

With the elderly population that reached 12% of the total population in 2016 on a steady rise in Taiwan, early detection of health problems has become an issue of crucial importance in promoting the health of this population. Starting in 1995, the Health Promotion Administration in Taiwan has offered free annual elderly health examination which includes past history, family history, health behavior survey, body weight, body height, abdominal circumference, visual acuity, blood pressure, urine protein and glucose, blood chemistry, physical examination, and health consultation. Taipei City Government adds extra items to the free annual health examination for its elderly residents, including: complete blood count, thyroid stimulating hormone, alpha-fetoprotein, immunochemical fecal occult blood test, chest X-ray, electrocardiogram, AD8 questionnaire for dementia screening (Galvin et al., 2005) and Brief Symptom Rating Scale (BSRS-5) for mental health screening(Lee et al., 2003). Though fairly comprehensive, these examination items are mainly disease-, instead of function- oriented. Both comorbidity (Gijsen et al., 2001) and disability (Fried et al., 1998) are associated with elderly mortality. Disability, however, has been found to work better than multimorbidity in predicting mortality among persons over 80 years old (Landi et al., 2010). In Taiwan, approximately 80% of the

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older adults have one chronic disease, and 60% are marked with the so-called co-morbidity condition as they have two or more chronic diseases. One major goal of geriatric medicine is to help the elderly maintain physical/mental function by reducing the risk of disability. Since frailty can be considered as a pre-disability state (Morley et al., 2002), early detection of frailty and subsequent intervention are essential in safeguarding the functionality in the elderly. Functional performance (Formiga et al., 2011; Formiga et al., 2016; Ponzetto et al., 2003; Taekema, Gussekloo, Westendorp, de Craen, & Maier, 2012), gait speed (Abellan van Kan et al., 2009; Studenski et al., 2011; Taekema et al., 2012) and functional decline (Formiga et al., 2016) are predictors of survival among old people. Several randomized controlled trials have proved the effectiveness of physical exercise (de Labra, Guimaraes-Pinheiro, Maseda, Lorenzo, & Millan-Calenti, 2015) and nutrition (Fiatarone et al., 1995; Kim et al., 2015) interventions. Functional evaluations should therefore be incorporated into regular – annual or otherwise – elderly health examinations so as to screen frailty among high risk elders and receive intervention to prevent further functional decline.

2. Methods

2.1. Study design

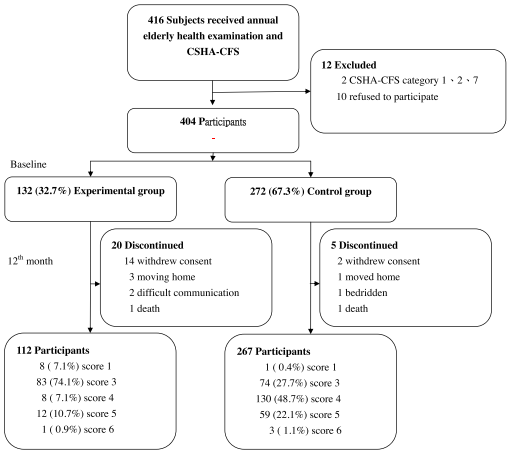
As a quasi-experimental controlled trial, 416 elderly adults (aged 70 and over) received annual elderly examination and Canadian Study of Health and Aging Clinical Frailty Scale Chinese In-Person Interview Version (CSHA-CFS) (Chan, Tsou, Chen, & Chen, 2010) were enrolled at Taipei City Hospital Yangming Branch in 2012. 2 persons whose CSHA-CFS scored 1,2,7 and 10 persons who refused to participate the study were excluded. 404 elders scoring 3–5 on CSHA-CFS were enrolled. 132 participants who agreed to receive functional evaluations joined the experimental group. 272 age-, gender-, and frailty score-matched subjects who refused functional evaluations were assigned to the control group for regular, routine elderly health examination. Ethics approval from the Taipei City Hospital Institutional Review Board (Registration number TCHIRB-1010313-E) and informed consent forms from the participants were obtained prior to the implementation of the study.

2.2. Interventions

Subjects in the experimental group received routine annual elderly health examination and functional evaluations including CSHA-CFS, frailty evaluations based on Fried Frailty Index (FFI) (Fried et al., 2001), timed up and go test(TUG) (Podsiadlo & Richardson, 1991), and Short-form Physical Performance Battery (SPPB) (Guralnik et al., 1994) at 0 and 12th month. Exercise instruction and nutrition education were provided at 0 and 3rd month. Exercise instruction included stretch exercise, weight training and balance exercise. Nutrition education consisted of balanced diet and high calcium, high protein food introduction. The research nurses were also responsible for reminding subjects in the experimental group to practice regular exercise and balanced nutrition through telephone interviews at 6th and 9th months. For members in the control group, the routine annual elderly health examination with CSHA-CFS evaluation was performed at 0 and 12th month. Both groups received telephone interviews for collecting data about adverse events (the number of hospitalization, emergency department visit, fall event, and mortality) at 3rd, 6th, 9th and 12th months. The interviewer was blind to the intervention the study subjects received. The subject enrollment procedure is outlined in Fig. 1.

2.3. Frailty and physical function evaluations

Subjects who scored 7 on the 7-point CSHA-CFS due to complete dependency in activities of daily living (ADLs) were excluded as they were too frail to receive intervention. On the other hand, subjects who scored 1 or 2 for showing no ADL or IADL (instrumental activities of daily living) dependency and having no treated chronic disease were also excluded because they were too healthy to require intervention (Rockwood et al., 2005). The frailty index proposed by Dr. Fried and her colleagues were used to evaluate the subjects in the experimental group based on the five indicators of frailty: shrinking, exhaustion, low physical activity, slowness, and weakness (Chang, Chan, Kuo, Hsiung, & Chen, 2011; Fried et al., 2001). The Chinese version of the International Physical Activity Questionnaire-Short Form (IPAQ-SF) was adopted to define energy expenditure, and subjects were defined as low physical activity according to the threshold reported by FFI (Fried et al., 2001). Lower extremity function was further assessed by TUG (Podsiadlo & Richardson, 1991), SPPB test (Guralnik et al., 1994), and one-leg stand performed in the manners described elsewhere



CSHA- CSHA-CFS, Canadian Study of Health and Aging Clinical Frailty Scale. The higher score means more independent in daily activity.

Fig. 1. Flow chart of Participants who entered the study.