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Physical Fitness of the Elderly People from Home for the Aged (Hninzigone), Yangon

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A cross-sectional, descriptive study was conducted to assess physical fitness in 145 elderly; 52 men (mean age=81.23±6.36 years) and 93 women (mean age=79.03±5.27 years), from the Home for the Aged (Hninzigone), Yangon by using the Senior Fitness Test. The test consists of six measures of physical fitness: (a) 30-second chair stand test, (b) 30-second arm curl test, (c) chair sit and reach test, (d) back scratch test, (e) 8-foot up and go test and (f) 2-minute step test. Most of elderly women had higher BMI (23.19±6.46 kg/m^2 *vs.* 22.98±4.24 kg/m^2, p=0.83) and significantly higher body fat percent (24.23±7.6% *vs.* 20.11±6.46%, p=0.001) than those of elderly men. Higher BMI of elderly women might be due to more body fat than elderly men. All the elderly had completed the six fitness tests. Elderly men had better performance in chair stand test (strength test) and 2-minute step test (aerobic endurance test) but elderly women had better performance in 8-foot up and go test (dynamic balance). This might be due to the fact that elderly men had more lean body mass than women. Scores from each test were compared to Americans' norms by subject's age and gender and described as performance better than the norm, same as the norm, or worse than the norm. Generally, better performance were seen in strength tests (chair stand and arm curl) than cardiovascular tests (2-minute step and 8-foot up and go) or flexibility tests (chair sit and reach and back scratch). The low scores of cardiovascular tests may be attributed to the fact that those types of exercise are not very common in the daily activity of elderly in Myanmar. However, the good result of chair sit and reach test is an essential part of their daily physical activity. In conclusion, this study found that there was a decrease in body fat percent and decrease levels of dynamic balance and flexibility in the aging process.

Key words: Physical fitness, Elderly, Senior Fitness Test Battery

INTRODUCTION

The older adult population of Myanmar has been increased over the last three decades. Percentage of persons older than 60 years was increased from 6.37 in 1980 to 8.77 in 2011.[1] With the projected growth in the older adult population, preventing or delaying physical disability in later years has become a national goal. Evidence suggests that physiological decline, especially that associated with physical inactivity is modifiable through proper assessment and activity intervention.

However, a major limitation in reducing loss of function in later years is the lack of suitable assessment tools. Of special concern is the ability to assess underlying physical parameters associated with common activities of daily living.[2] Recognizing the need for a tool to evaluate the functional fitness performance of older adults, researchers at California State University, Fullerton, developed and validated a new fitness test battery especially for older adults: the Senior Fitness Test.[3]

Physical fitness parameters such as strength, flexibility, coordination and endurance can

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be measured by the Fullerton Functional Fitness Test, invented by Rikli and Jones in the Lifespan Wellness Clinic at California State University in Fullerton. It uses six items to assess these parameters; (a) arm curl test to indirectly assess the upper body strength, (b) 30-second chair stand test to assess lower body strength, (c) back scratch test to assess upper body flexibility, (d) chair sit-and-reach test to assess lower body flexibility, (e) 8-foot up-and-go test to assess the agility/dynamic balance and (f) 6-minute walk trial describes indirectly, the level of aerobic endurance and step-in-place test is performed instead of 6-minute walk trial in case of persons, who use orthopaedic devices during walking, as well as in case of persons with difficulties associated with maintenance of balance.

Because of limitations resulting from age and coexisting diseases, it is required that some easy and safe motor patterns are used that should be based on everyday activities. It is safe for the adults, requires minimal equipment and can measure small unit changes. It is suitable even for patients with cardiovascular disease.[4]

Although many studies had been done on assessment of physical fitness of school children;[5] office workers and labourers;[6] military personnel, dependents and some civilians,[7] but lack of studies on physical fitness of elderly in Myanmar.

The Hninzigone Home for the aged, Yangon, is a non-profit humanitarian non-governmental organization in Myanmar. Its mission is to provide accommodation and care for the helpless and homeless aged senior citizens in the evening years of their lives. Preventing or reducing loss of function in later years depends, in part, on the ability to detect and treat any physical declines that may be precursors to more serious loss of function.[8]

Early identification of physical decline and appropriate interventions could help to prevent functional impairments, such as in walking and stair climbing that often result in falls and physical frailty.[9] Monitoring the level of functional fitness is especially important for elderly people above 60 years for preventing many diseases, occurrence of immobilization and reduction of mortality rate, thus, the study aimed to assess physical fitness of elderly people from Home for the Aged (Hninzigone), Yangon.

MATERIALS AND METHODS

A cross-sectional, descriptive study was done at the Home for the Aged (Hninzigone), Yangon. A total of 145 elderly men and women (52 men and 93 women) (>65 year of age), who can walk and dress unaided were voluntarily participated.

Exclusion criteria

- Participant's bad general feeling
- Chest pain (discomfort)
- ECG evidence of ischemia and arrhythmia
- Uncontrolled arterial blood pressure exceeding 160/100 mmHg
- Musculoskeletal disorder
- Recommendation of the Medical officer not to perform the test

Procedure of the study

Firstly, primary screening such as blood pressure (BP) measurement and electro-cardiogram (ECG) were done after taking informed consent and elderly were selected according to inclusion and exclusion criteria. Then, filling out proforma, anthro-pometric measurements (height, weight, waist and hip circumferences, skinfold thickness) were done by well-trained technician. BMI, waist-hip ratio and body fat composition were calculated. The testing location was equipped with drugs to deal with emergencies and medical officer standby.

Before starting the functional fitness tests, the elderly was asked to perform the tasks as good as possible. Appropriate safety was secured by proper positioning of the devices used during the testing procedure.

Before and after the tests, arterial blood pressure and heart rate were measured. Performance of each functional fitness test was preceded by a demonstration and the examined elderly could preliminarily check his ability to perform particular tests in order to get familiar with their proper course.

The performance of the tests was started with the arm curl test, and subsequently the back scratch test, the 30-second chair stand test, the chair sit-and-reach test, the 8-foot up-and-go test, and the last, 2-minute walk in place test was performed. It was terminated in case the examined person reports dizziness, nausea, excessive fatigue, pain, or if the examiner notices other alarming symptoms.

"Anthropometric measurements"

Waist circumference (WC)

Waist circumference was measured by measuring tape with the subject stands with feet 25-30 cm apart and weight evenly distributed. Measurement was taken at the midway between the inferior margin of the last rib and the crest of the ilium in the horizontal plane. The measurer sat by the subject and fit the tape snugly without compressing the soft tissue. The circumference was measured to nearest 0.1 cm.

Hip circumference (HC)

This was measured as in WC around the pelvic at the point of the maximal protrusion of the buttocks.

Waist-hip ratio

The ratio of WC and HC was calculated.

Skinfold thickness

Triceps skinfold thickness (TSF) and biceps skinfold thickness (BSF) of the right arm were measured to the nearest 0.1 mm with a pair of calipers (GIMA, Italy), in duplicate. Body fat percentage was calculated using the equations described by Kwok, Woo and Lau.[10]

"Tests for functional fitness of the elderly"

Each subject was asked to perform the following tests.

Arm curl test (To assess upper body strength)

Description

Number of bicep curls that can be completed in 30 seconds holding a hand weight of 5 lbs (2.27 kg) for women, 8 lbs (3.63 kg) for men.

Risk zone

Less than 11 curls using correct form for men and women.

30-second chair stand test (To assess lower body strength)

Description

Number of full stands that can be completed in 30 seconds with arms folded across chest.

Risk zone

Less than 8 unassisted stands for men and women.

Back scratch test (To assess upper body (shoulder) flexibility)

Description

With one hand reaching over the shoulder and one up the middle of the back, the number of inches (cm) between extended middle fingers (+ or -).

Risk zone

Men: Minus (-) 4 inches or more
Women: Minus (-) 2 inches or more

Chair sit-and-reach test (To assess lower body flexibility)

Description

From a sitting position at front of chair, with leg extended and hands reaching toward toes, the number of inches (cm) (+ or -) between extended fingers and tip of toe.

Risk zone

Men: Minus (-) 4 inches or more
Women: Minus (-) 2 inches or more

8-foot up-and-go test (To assess agility/ dynamic balance)

Description

Number of seconds required to get up from a seated position, walk 8 feet (2.44 m), turn, and return to seated position.

Risk zone

More than 9 seconds.

The 2-minute walk-in-place test (Aerobic endurance test)

Description

Number of full steps completed in 2 minutes, raising each knee to a point midway between the patella (knee cap) and iliac crest (top hip bone). Score is number of times right knee reaches the required height.

Risk zone

Less than 65 steps for men and women

Statistical analysis

Data were analyzed by using SPSS-version 16. Results were expressed as the mean± standard deviation (SD) or standard error (SE). Univariate analysis of variance (ANOVA) was used to determine the differences between age groups. Bonferroni correction was used to determine which of groups were statistically different. Statistical significance was set at $p<0.05$.

RESULTS

Table 1. General characteristics of the elderly men and women

Characteristics	Men	Women	p value
Mean age (yr)	81.23±6.36	79.03±5.27*	0.027
Weight (kg)	56.46±11.26	49.88±14.01*	0.004
Height (cm)	156.8±8.27	146.68±5.33*	0.000
BMI (kg/m^2)	22.98±4.24	23.19±6.46	0.83
Body fat percent (%)	20.11±6.46	24.23±7.6*	0.001
WC (cm)	85.55±13.77	82.28±8.53	0.08
HC (cm)	93.6±16.28	91.28±8.42	0.26
Waist/hip (cm)	0.93±0.15	0.9±0.07	0.197
Resting HR (beats/min)	86.06±12.03	81.32±9.37**	0.009
Resting SBP (mmHg)	139.25±14.4	142.24±12.84	0.201
Resting DBP (mmHg)	80.29±8.6	80.37± 9.26	0.96

BMI=Body max index, WC=Waist circumference, HC=Hip circumference, HR=Heart rate, SBP=Systolic blood pressure, DBP=Diastolic bold pressure
Data were calculated by using Independent samples. "t" test and expressed as mean±SD
*means statistically significant ($p<0.05$)
**means statistically significant ($p<0.01$)

Table 2. General characteristics of elderly men and women according to age groups

Age	Number (%)	Standing height (cm)	Body weight (kg)	BMI (kg/m^2)	Body fat (%)
70-74	26 (17.93)	150.14 ±5.83	54.5 ±10.79	24.18 ±4.55	24.94 ±6.43
75-79	51 (35.17)	149.99 ±9.66	53.69 ±17.4	23.92 ±7.84	24.19 ±9.2
80-84	40 (27.59)	150.10 ±7.78	51.6 ±11.45	22.8 ±4.12	22.13 ±5.46
85-89	19 (13.1)	151.24 ±8.57	48.21 ±9.92	21.0 ±3.66	19.41 ±6.29
90	9 (6.21)	151.56 ±5.96	48.89 ±6.85	21.33 ±3.20	18.1 ±5.09
Total	145	150.31 ±8.13	52.24 ±13.43	23.11 ±5.75	22.75 ±7.45

One way ANOVA test (Bonferroni correction)
Data were expressed as mean±SD.

Table 3. Comparison of functional fitness tests' scores between elderly men and women

Tests	Men	Women	p value
Chair stand (No. of stands)	14.5±0.92	11.6 ±0.51**	0.003
Arm curl (No. of reps)	19.19±0.67	18.54±0.37	0.35
2-minute step (No. of steps)	69.37±2.82	58.22±2.56**	0.006
Chair sit-and-reach (Inches +/-)	-0.87±1.35	1.99±1.38	0.18
Back scratch (Inches +/-)	-10.66±2.03	-9.84±1.37	0.73
8- foot up-and-go (Seconds)	8.82±0.42	10.43±0.31**	0.002

Independent paired "t' test
Data were expressed as mean±SE.
**means statistically significant ($p<0.01$).

Table 4. Physical fitness of elderly men and women in comparison with Americans' norms[3]

Test	Norm (Percent)					
	Worse than		Same as		Better than	
	Men	Women	Men	Women	Men	Women
Chair stand	19.23	23.66	48.08	52.69	32.69	23.66
Arm curl	3.85	4.3	46.15	26.88	50	68.82
2-minute step	53.85	46.24	42.31	52.69	3.85	1.08
Chair sit-&-reach	25	20.43	30.77	31.18	44.23	48.39
Back scratch	55.77	56.99	13.46	16.13	0.77	26.88
8-foot up-&-go	9.62	83.87	30.77	16.13	9.62	0

DISCUSSION

The level of physical activity is often used as a parameter for monitoring and evaluation of public health. This monitoring is especially important for the elderly to prevent many diseases, occurrence of immobilization and reduction of mortality rate.[11] In this study, although the elderly

men and women had no significant difference in body mass index (BMI), elderly men had significantly higher height and weight than elderly women. Conversely, body fat percentage was significantly higher in elderly women than that of the elderly men. Higher BMI of elderly women might be due to more body fat than elderly men. Resting systolic blood pressure (SBP) and diastolic blood pressure (DBP) had no significance difference in terms of gender Table 1.

In this study, the average BMI of all the elderly (with the mean age of 79.82± 5.76 years) was 23.11±5.75 kg/m^2 and the highest BMI value was seen in 70-74 year age group (24.18±4.55 kg/m^2). This finding was agreed with the finding of Milanovic, *et al.* 2012[11] in which physical fitness of men older than 60 years was studied and found higher BMI values in the age group of 70-74. Lower BMI values were seen in the age group of 85 years and above in the present study. In contrast to the finding, Perissinotto, *et al*. (2002)[12] found lower BMI values between the ages of 65-75 than in the period between 75-80.

In this study, the higher the age, the lower the BMI and body fat percent were seen. This finding was agreed with the previous Myanmar study.[13] Reducing body fat could lead to better physical fitness and working capacity. However, this finding was not agreed with the concept that age-related changes in body composition were decreases in fat free mass and increases in fat mass. Milanovic, *et al*. (2012)[11] also stated that aging is associated with a higher percentage of body fat and body fat distribution. Distribution of lower-body subcutaneous adipose tissue in the abdominal and visceral part is the most common with the elderly people.

In this study, all the elderly had completed the six fitness tests. Elderly men had better performance in chair stand test (strength test) and 2-minute step test (aerobic endurance test). This might be due to the fact that elderly men had more lean body mass than women. However, elderly women had better performance in 8-foot up-and-go test (dynamic balance).

There was no statistically significant difference ($p>0.05$) in arm curl test, back scratch test and 2-minute step test in all age groups. The subjects aged 70-74 significantly differed ($p<0.05$) in the chair stand test and 8-foot up-and-go test compared to 80-84 years of age and they also significantly differed ($p<0.05$) in the chair sit-and-reach test in compared to subjects aged 85-89 years of age. The results showed statistically significant decrease of muscle strength, dynamic balance and flexibility in elderly older than 80 years. Elderly men and women are less physically active with aging process which could be reflected on their muscular strength and dynamic balance. Decrease in muscle strength during the aging process is the result of significant loss of muscle mass, which may cause the decrease in physical activity[14] but impaired dynamic balance may also increase the risk of falls and injuries in older people.

Scores from each test were compared to Americans' norms by subject's age and gender and described as performance better than the norm, same as the norm, or worse than the norm. Generally, performance was better in strength tests (chair stand and arm curl) than cardiovascular tests (2-minute step and 8-foot up-and-go) or flexibility tests (chair sit-and-reach and back scratch). The low scores of cardiovascular tests may be attributed to the fact that those types of exercise are not very common in the daily activity of elderly in Myanmar. However, the good results of chair sit-and-reach test is essential part of their daily physical activity. The reduction of muscle function should be attributed to a combination of factors such as aging and physical inactivity.[15, 16]

The reduction of the number of muscle fibers and reduction in activation of motor units during the aging process[14] might decrease the muscle strength, flexibility and endurance in elderly people. These changes

could lead to a greater risk of cardiovascular and respiratory diseases. Other researchers found that appropriate level of training can maintain muscle strength and endurance.[17, 18] Thus, physical activity intervention and monitoring of physical fitness should be done regularly in elderly people.

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