Effect of Six Weeks Flexion Exercise Programme on the Health Related Fitness Components of selected Older Adults in Nigeria

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Abstract

The aging process happens during an individual's lifespan. Everybody is involved in this process and none can escape it. Almost half the community where old individuals dwell report daily pain, which mostly concerns pain in muscles and joints. Joint pain often affects functioning, in terms of mobility, functional independence, participation in social activities, as well as quality of life and is among the ten leading causes of disability-adjusted life years in high income countries. Exercise has been known over the years to be of great value to health and as a tool for treatment and rehabilitation. The purpose of this study therefore is to assess the effects of flexion exercise programme on the health related fitness components of selected older adults in Lagos State. The experimental research design was adopted. The population for this study comprised older adults living in the Government owned Old Peoples' home, Lagos State and the sample comprised 20 older adults (age range 66-87yrs) who both volunteered and gave their consent to participate in the study. The participants were placed on a graded flexion exercise programme, three times every week, 30 minutes each session for a period of six weeks. The resting heart rate, resting blood pressure, body weight, body fat, handgrip strength, knee girth and range of motion were determined. The descriptive statistics of mean, standard deviation, graphical illustrations and the inferential statistics of t-test at 0.05 alpha level were used in analysing the data. There were no significant effects on heart rate; blood pressure; body weight; body fat; hand grip strength and knee girth. But there was significant improvement on the range of motion of participants. The study justifies the adoption of flexion exercise programme for improving the range of motion in older adults. The study recommends a graded, moderate to high intensity long-term exercise programme for individuals including the provision of exercise facilities for older adults in Lagos State.

Keywords: aging, rehabilitation, range of motion,

Introduction

The aging process happens during an individual's lifespan. Everybody is involved in this process and none can escape it. When one is young, aging is associated with growth, maturation, and discovery. Many human abilities peak before age 30, while other abilities continue to grow through life. The great majority of those over age 65 today are healthy, happy and fully independent. In spite of this, some individuals begin to experience changes that are perceived as signs of deterioration or decline.

The global population is ageing at a rapid rate. In 1950, just over five percent of the world's population was 65 years or older. By 2006, that number had jumped to eight percent. By 2030, experts anticipate that older adults will comprise 13 percent of the total population-one in eight people will be 65 or older (Lopez, Mathers, Ezzati, Jamison & Murray, 2006). While developing countries will experience the most rapid growth in ageing, with increases of up to 140 percent, developed countries will experience increases averaging 51 percent (Women who tend to outlive men will comprise the bulk of the older adult population), (Chan Cheung Ming, Cheng & Phillips, 2007; World Health Organization, 2003). Simultaneously, overall population is declining in many countries due to low fertility rates, HIV/AIDS, and international migration (National Institute on Aging, 2007). The United Nations estimates that the number of adults 60 years and older will out-number children under the age of 15, an historical first by 2045 (United Nations, 2007).

Almost half of the community where older adults dwell report daily pain (Sawyer, Bodner, Ritchie & Allman, 2006) which mostly concerns pain in muscles and joints (Chodosh et al., 2004). Joint pain often affects functioning, in terms of mobility, functional independence, participation in social activities, as well as quality of life (QoL) (Onder et al., 2006; Wilkie, Peat, Thomas, Croft, 2007) and is among the ten leading causes of disability-adjusted life years in high income countries (Mathers & Loncar, 2006). In daily clinical routine, the general practitioner (GP) is the first point of contact for older adults with joint pain and provides both assessment and treatment (Mallen, Peat, Thomas, Dunn & Croft, 2007). However, evidence suggests that only 15-30% of the older population with joint pain consult their general practitioner GP (Grime, Richardson, Ong, 2010; Jinks, Ong, Richardson, 2007; Thorstensson, Gooberman-Hill, Adamson, Williams, Dieppe, 2009) despite several available treatment options. Furthermore, research shows that joint pain is often poorly recognized and treated in primary care when older people do contact their general practitioner GP (Bruckenthal, Reid & Reisner, 2009; Catananti & Gambassi, 2008).

The profile of age-related disability in developing countries may be peculiar. For example, WHO (2015) published a data on life expectancy in Nigeria: Male 53.4, female 55.6; total life expectancy, 54.5, which gives Nigeria a World Life Expectancy ranking of 171. In such a setting, it is reasonable to believe that persons surviving to the age of 65 years and over may represent a constitutionally resilient sub-group. Despite worldwide increase by five years in life expectancy with Africa seeing the biggest improvement, Nigeria is among the seven countries with the lowest scores with average of 54.5 years for both men and women (The online guardian, 2016).

However, while exercise may not completely stop the biological aging process, it can provide many positive benefits. Benefits include increasing life expectancy and decreasing the progression

and development of some chronic diseases while decreasing the risk of disability. Living an inactive or sedentary lifestyle can have many negative side effects including increased fatigue, sleep disturbances, difficulty with everyday tasks and decreased self-esteem. This study therefore assessed how flexion exercise programme helped improve range of motion, knee girth and balance; preventing free fall which could cause severe injury, and delaying the negative impact of aging of old individuals.

The following research hypotheses were raised for this research study:

1. Flexion exercise programme will not have significant effect on the resting heart rate and blood pressure of older adults.

2. Flexion exercise programme will not have significant effect on physical characteristics of body weight and body fat of older adults.

3. Flexion exercise programme will not have significant effect on the handgrip strength, knee girth and range of motion of older adults.

Methods

The experimental research design was adopted in this study. It involved two groups of participants: the experimental group that undergone six weeks flexion exercises and controlled group that only experienced pre and post measurement without going through the flexion exercises. The population for the study comprised older adult living in Old Peoples' Homes in Lagos State (age range 66-87yrs). The purposive sampling technique was used in selecting twenty (20) older adults from Old People's Home Sabo-Yaba in Lagos State which formed the sample size. This was to ensure that those selected were clinically healthy (i.e. have well controlled blood glucose and blood pressure). Ten participants served as controlled group and the other ten participants served as experimental group.

All participants in experimental group were placed on a graded flexion exercise (3 times per week) for 30mins, for a period of six weeks. Also anthropometric measures were taken before and after the exercise programme. The exercise involved five minutes warm-up, flexion exercises as core and cool down for five minutes. Data were collected using the following equipment: Heart rate, Systolic and Diastolic Blood Pressure (Using Omron's M6 AC HEM-7322E Blood Pressure Monitor), Weight (Using a Camry weigh Scale), Waist and Hip circumference (Using a tailor's measuring Tape), Waist Hip Ratio (Waist Circumference/Hip Circumference), Muscular Strength (Camry Hand Grip Dynamometer), Knee Girth (Using a tailor's measuring Tape) and Range of motion (Flexible Goniometer). Data collected were analysed using the descriptive statistics of mean, standard deviation and graphical illustration. All hypotheses were tested using inferential statistics of t-test at 0.05 level of significance.

Results

Table 1: Physical Characteristics and Physiological Variables of Participants. The results show the mean values for the age, heart rate, blood pressure, weight, waist and hip circumference, waist to hip ratio, hand grip, knee girth and range of motion.

Table 1: *Physical Characteristics and Physiological Variables of Participants*

Variables	Experimental Group (n= 10)		Control Group (n= 10)	
	Mean	SD	Mean	SD
Age (yrs)	73.50	6.98	72.70	7.08
Heart Rate (bpm)	76.50	12.15	71.70	13.76
Systolic BP (mmHg)	144.10	13.26	140.20	6.78
Diastolic BP (mmHg)	83.10	7.48	81.90	7.03
Weight (kg)	67.80	9.72	67.50	11.23
Waist Circumference (cm)	100.35	14.47	100.45	9.94
Hip Circumference (cm)	101.20	10.53	96.60	13.13
Waist-Hip Ratio	0.99	0.06	1.05	0.06
Hand Grip Right (kg)	17.14	5.96	17.39	5.65
Hand Grip Left (kg)	12.97	7.97	17.16	5.95
Knee Girth Right	37.30	2.58	37.70	5.65
Knee Girth Left	37.50	2.89	37.50	5.95
ROM Right	134.80	13.43	132.00	12.29
ROM Left	137.70	10.93	136.20	13.37

Table 2 presents the effect of flexion exercise on the resting values of participants. The results show that six weeks of flexibility exercise will have no significant effect on the resting heart rate and blood pressure of selected older adults.

Table 2: *Effect of Flexion Exercise on the Resting Values of Participants*

Heart Rate						
Experimental Group (n= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Heart Rate Pre Test (b/m)	71.20	13.40	18	0.927	2.10	NS
Heart Rate Post Test (b/m)	76.50	12.15				
Control Group (n= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Heart Rate Pre Test (b/m)	71.00	14.40	18	0.111	2.10	NS
Heart Rate Post Test (b/m)	71.70	13.76				
Systolic Blood Pressure						
Experimental Group (n= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Systolic BP Pre Test (mmHg)	145.10	14.68	18	0.16	2.10	NS
Systolic BP Post Test (mmHg)	144.10	13.26				
Control Group (n= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Systolic BP Pre Test (mmHg)	139.30	7.24	18	0.29	2.10	NS
Systolic BP Post Test (mmHg)	140.20	6.78				
Diastolic Blood Pressure						
Experimental Group (n= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Diastolic BP Pre Test (mmHg)	85.10	9.90	18	0.51	2.10	NS
Diastolic BP Post Test (mmHg)	83.10	7.48				
Control Group (n= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Diastolic BP Pre Test (mmHg)	81.90	7.00	18	0.03	2.10	NS
Diastolic BP Post Test (mmHg)	81.90	7.03				

Note: p >0.05; NS= Not Significant

Table 3 presents the effect of flexion exercise on the physical characteristics of participants. The results show that six weeks of flexibility exercise will have no significant effect on the weight and waist to hip ratio of selected older adults.

Table 3: *Effect of Flexion Exercise on the Physical Characteristics of Participants*

Weight						
Experimental Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Weight Pre Test (kg)	67.50	11.23	18	0.06	2.10	NS
Weight Post Test (kg)	67.80	9.72				
Control Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Weight Pre Test (kg)	67.50	11.23	18	0.01	2.10	NS
Weight Post Test (kg)	67.50	11.23				
Waist to Hip Ratio						
Experimental Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
WHR Pre Test	0.99	0.06	18	0.96	2.10	NS
WHR Post Test	0.99	0.06				
Control Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
WHR Pre Test	1.05	0.06	18	1.00	2.10	NS
WHR Post Test	1.05	0.06				

Table 4 presents the effect of flexion exercise on the hand strength, knee girth and range of motion (ROM) of participants. The results show that six weeks of flexibility exercise will have a significant effect on the handgrip strength, knee girth and range of motion of selected older adults.

Table 4: *Effect of Flexion Exercise on the Hand Strength, Knee Girth and Range of Motion (ROM) of Participants*

Hand Grip Strength						
Experimental Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Hand Grip Right (Pre Test) (kg)	16.18	6.19	18	0.35	2.10	NS
	17.14	5.96				
Hand Grip Left (Post Test) (kg)	16.12	7.85	18	0.89	2.10	NS
	12.97	7.97				
Control Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Hand Grip Right (Pre Test) (kg)	17.38	5.75	18	0.004	2.10	NS
	17.39	5.65				
Hand Grip Left (Post Test) (kg)	17.18	5.90	18	0.008	2.10	NS
	17.16	5.95				
Knee Girth						
Experimental Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Knee Girth Right Leg						
(Pre Test) (cm)	37.50	2.92	18	0.16	2.10	NS
	37.30	2.58				
Knee Girth Left Leg						
(Post Test) (cm)	37.30	2.58	18	0.17	2.10	NS
	37.50	2.89				
Control Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
Knee Girth Right Leg						
(Pre Test) (cm)	37.70	5.75	18	0.001	2.10	NS
	37.70	5.65				
Knee Girth Left Leg						
(Post Test) (cm)	37.50	5.90	18	0.000	2.10	NS
	37.50	5.95				
Range of Motion (ROM)						
Experimental Group (N= 10)	**Mean**	**S.D**	**Df**	**t-calc**	**t-crit**	**Remark**
ROM Right (Pre Test)	130.00	17.00	18	2.70*	2.10	S
	134.80	13.43				
ROM Left (Post Test)	135.70	17.62	18	2.31*	2.10	S
	137.70	10.93				
Control Group (N= 10)	**Mean**	**S.D**		**t-calc**	**t-crit**	**Remark**
ROM Right (Pre Test)	132.00	12.29	18	0.000	2.10	NS
	132.00	12.29				
ROM Left (Post Test)	136.20	13.37	18	0.000	2.10	NS
	136.20	13.37				

*Note: *p<0.05; p>0.05; S= Significant; NS= Not Significant*

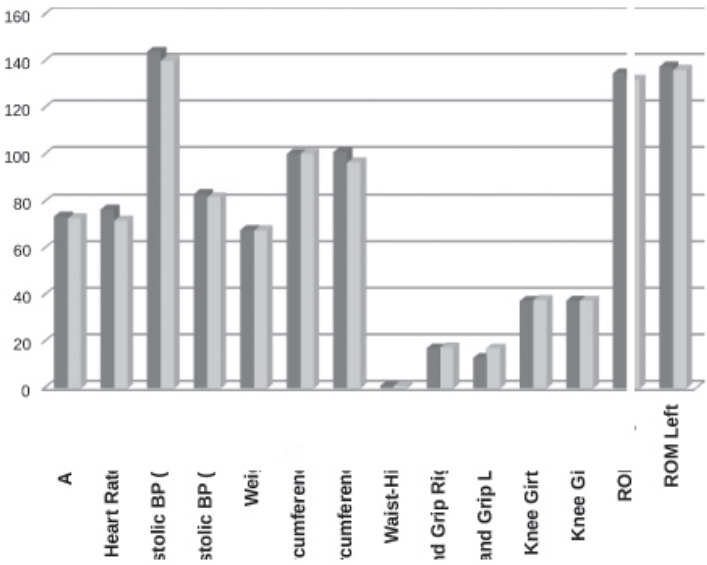

Figure 1 presents the Bar Chart of the Physical Characteristics and Physiological Variables of Participants.

Discussion of Findings

The purpose of this study was to assess the effectiveness of flexion exercises programme on the health related fitness components of selected older adults in Lagos State. The non-significant relationship between six weeks flexion exercise programme and the resting heart rate of older adults in Lagos state corroborates with the meta-analysis of training studies in persons aged 60 and older conducted by Huang, Gibson, Tran, and Osness (2005). Booth, Laye and Roberts (2011) also observed that changes in cardiorespiratory fitness throughout life alter the rate of mortality even in individuals older than 70 years. These studies agreed that training of higher intensity and longer duration elicited the improvement in cardio fitness of individuals age 60 and above. Also the non-significant relationship between exercise programme and resting blood pressure of participants is in line with American Heart Association (1998) which recommends at least 150 minutes of moderate exercise or 75 minutes of vigorous exercise weekly for sedentary or active individuals who wants to keep their hearts in good condition.

The non-significant relationship between exercise programme

and physical characteristics of body weight and body fat of participants is in line with Chau, Cho, Jani and Jeor (2008) study which concluded that unlike weight management goals for younger adults, who may want to lose weight aggressively, the goal for older adults should be to stabilize weight while avoiding further weight gains. Shiroma, Sesso and Lee (2012), also observed that moderate intensity exercise for one hour per day is effective in preventing weight gains in obese older adults while yielding an array of social, physical, and cognitive benefits and can help prevent increases in fat weight while preserving, or even increasing, lean body (muscle) mass in older adults.

The finding on handgrip strength and knee girth of participants agrees with Morganti, Nelson and Fiatarone (1995) which concluded that it takes a longer period to improve muscles strength of elderly than younger adults. Marcus, Addison, Kidde, Dibble, and Lastayo (2010) also concluded that aging is accompanied by an increase in muscle fatty infiltration, and that this fatty infiltration is amenable to change after 12 weeks of thrice-weekly resistance training in a group of older individuals with a variety of co-morbid conditions.

Findings on range of motion of participants agrees with Decoster, Cleland, Altieri & Russell, (2005) which observed that older adults experience greater transient improvements in flexibility with longer durations (30-60 sec) of static stretching and after 3-12 weeks of a regular static stretching programme at a frequency of at least 2-3 times a week. American College of Sports Medicine (1998) also discussed that the purpose of a flexibility programme is to develop range of motion (ROM) in the muscle-tendon groups in accordance with individualized goals, and static stretching can improve flexibility.

Conclusion and Recommendations

Based on the findings of this study, it was concluded that six weeks flexion exercise programme does not have effect on physiological parameters of resting heart rate, resting blood pressure, body weight, % body fat (%BF), handgrip strength and knee girth but had effect on range of motion at the knee of selected older adults living in Old Peoples' Homes in Lagos State. Therefore the following recommendations were made: a graded, moderate to high intensity long-term exercise programme be carried out on the population and the Department of Human Kinetics and Health Education should consider to carryout a longitudinal study of different exercise programmes on the population. In conclusion, Governmental and non-governmental agencies or organizations and free donors should be approached to provide sporting facilities or a mini gymnasium for old peoples' homes in the state.

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