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Exercises training program: It's Effect on Muscle strength and Activity of daily living among elderly people

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ABSTRACT

Background: Aging is associated with the loss of muscle strength and difficulties in functional activities. **Aim of the study:** This study aimed to evaluate the effect of exercise training program on strength of muscles and improve elderly performance of Activity of daily living **Research design:** Quasi-experimental research design was utilized in the current study. **Subjects:** The study sample including 80 elderly clients male and female, were collected through one year. **Setting:** This study was carried out at three geriatric homes in Minia city (Dar Omar Bn El- khatab- Dar El- Qedesa Hena- Dar El- raee el saleh).**Tools of data collection:** Three tools were utilized in collecting data; **tool I**: Interview structured questionnaire; **tool II**: Muscle Strength Scale for upper and lower limbs; **tool III:** Katz and Akpom scale; **Methods:** The researcher design booklet in Arabic language and give exercises training program for elderly clients. **Results:** The current study findings revealed that the level of independence of elderly clients at the end of program became (87.5%), there was a highly Statistical significant differences in muscle strength in upper limbs that (37.5%) have normal muscle strength, also highly Statistical significant differences in lower limbs that (58.75%) have normal muscle strength in lower limb. **Conclusion**: The study findings concluded that the regular performing exercises for long period enhances the performing of activity of daily living, and strength body muscles which improve general health. **Recommendations**: We have to spot the light on geriatrics to be a part of the education and exercises training program in geriatric homes and community and improve awareness of the public specially the older adults and their care giver about importance of sports and exercises.

Key words: Elderly people–Activity of daily living–Exercise training program–Muscle strength

1 INTRODUCTION

Population ageing is widespread phenomenon across the world. According to the U.S. Census Bureau, the proportion of adults ages 65 years and older is projected to grow from 15 % in 2015 to 24 % of the population in 2060. **[1].** Also, Egypt is expected to have the largest number of old (23.7 million) and oldest old (3.1 million) populations in the region in 2050. **[2]**

Aging changes cause change in physical appearance and a decline in function. Measurable changes in shape and body occur. The body's ability to maintain homeostasis becomes increasingly diminished with cellular aging, and organ systems cannot function at full efficiency because of cellular and tissue deficits. **[3].**

In older individuals, decreased muscle strength is highly predictive of functional limitations and disability, and a minimum level of strength is needed to perform tasks of daily living. Most functional tasks used in normal day-to-day activities are of relatively short duration and, therefore, more strongly related to muscular strength than to muscular endurance. In the last decade, evidence from epidemiological studies has shown that muscle weakness, especially low muscular strength, is inversely associated with risk of falling in older adults. **[4]**

Exercise can enhance physical fitness components such as muscle strength, aerobic endurance, coordination, balance, and flexibility. Improving muscle strength is very important because institutionalized older people often experi-

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ence weakness which results in a slower walking speed and lower levels of physical activity. Very few data are available concerning the effects of exercise on ADL performance, for older people, there are two different ways to improve muscle strength through exercise. One is by training localized muscle groups. The other is by training functions related to motor activities such as walking, stair climbing, standing up from a chair, rising from a bed, reaching, and bending. These functions are embedded in the daily tasks faced by older institutionalized persons. Exercise programs aimed to improve daily tasks should include functional training items to be as effective as possible. **[5]**

2 SIGNIFICANCE OF THE STUDY

Global population aged 60 years or over numbered 962 million in 2017, more than twice as large as in 1980 when there were 382 million older persons worldwide. The number of older persons is expected to double again by 2050, when it is projected to reach nearly 2.1 billion**. [6]**

The incidence of physical performance limitation among older population will increase as well. As much as 42% of those over 60 years of age have difficulties in performing activities of daily living (e.g. walking speed or standing up from a chair), 15–30% report being unable to lift or carry 10 pounds (4.5 kg), and >30% are confronted with physical disabilities. **[7].**

3 AIM OF THE STUDY:

The aim of the present study was to assess the effect of Exercise program on muscle strength, Activity of daily living among Elderly People.

Research Hypothesis:

To fulfill the aim of the study, It was hypothesized that the elderly people after performing exercises training program, will be improve the performance of activity of daily living, strengthen of muscles and improve general health.

- Subjects and Methods

Research design

Quasi-experimental research design was utilized in the current study**.**

Subjects

Purposive sample of 80 elderly clients male and female were collected through one year.

Inclusion Criteria:

-Patients 60 years and older of both sex.

-Able to make exercises and perform Activity of daily living and balance

Exclusion criteria:-

-Illiterate clients

-Bedridden elderly.

-Severely limiting arthritis.

-Severe psychiatric diseases

-Elderly have any health disorders are contraindicated for performing exercise.

-Elderly have any health disorders are affect the balance and movement**.**

Setting:-

The current study was carried out at three geriatric homes in minia city (Dar Omar Bn El khatab- Dar El Qedesa Hena- Dar El raee el saleh).

Study Duration:

The current study was conducted over aperiod of one year starting from August 2017 to August 2018.

Tool II: Katz and Akpom scale:

Was used to assess activities of daily living. This scale was used pre and post performing exercises. The scale included six main activities of daily living, bathing, dressing, feeding, transfers, continence, and ambulation. The six different functions are measured and scored according to the individuals' actual performance of these functions. They are categorized into three levels of dependency: each item was scored from one to three, where one indicates full independence i.e. "ability to perform the task without human assistance', two indicates that the elder need assistance i.e. "ability to perform the task with some help, and three indicates total dependence i.e. "inability to perform the task even with assistance". The total score of the scale is 6-18. According to Katz and Akpom scale elderly were classified into three categories:

Independence: those with score of 6 points.

Partially dependence: score 7 to 12 points.

Totally dependence: those who scored 13 to 18.

Tool III: Muscle Strength Scale for (Upper& Lower) Limbs:-

This scale Adopted from [8]. This scale was used pre and post performing exercises. This scale assess muscle strength. Scoring system (0-5 score), complete paralysis for patient who have score(0), Only a trace or flicker of movement is seen or felt, or fasciculations are observed have score(1), Muscle can only move if resistance of gravity is removed take score(2), Strength further reduced such that joint can be moved only against gravity with examiner's resistance completely removed have score(3), Strength reduced, but contraction can still move joint against resistance have score(4), while a score of (5) is given for patient who have normal strength.

4 MUSCLE STRENGTH SCALE

Tools validity:-

Content validity was done to identify the degree to which the used tools measure what was supposed to be measured. The developed tools were examined by a panel of three experts opinion in the field of the study {Minia University - faculty of nursing (Medical Surgical Nursing Department)} All jury members (100%) agreed that current study tools were valid and relevant with the aim of the study.

Tools reliability:-

Cronback's Alpha test was performed to check the stability of the internal consistency of instruments.

0-5 SCALE	Effort
5	Muscle contracts against full resistance
4	Strength reduced, but contraction can still move joint against resistance
3	Strength further reduced such that joint can be moved only against gravity with examiner's resistance completely removed.
2	Muscle can only move if resistance of gravity is removed.
1	Only a trace or flicker of movement is seen or felt, or fasciculations are observed,
0	No movement

Pilot study:-

A pilot study was carried out on 10% (n = 8) of the total sample to test the clarity of tools and estimate the time required for fulfilling it. Based on results of the pilot study no modifications or refinements were done and the subjects included to the actual sample.

Ethical Considerations:-

An official permission to conduct the study was obtained from the Ethical committee in the Faculty of Nursing, and agreement from Egypt academic for research center and technology. to carry out this study. Subject's participation in this study was voluntary and each involved subject was informed about the purpose, procedure, benefits, and nature of the study, and that he/she had the right to withdraw from the study at any time without any rationale, then written consents were obtained. Confidentiality and anonymity of each subject were ensured through coding of all data and protecting the obtained data.

5 PROCEDURE:-

The current study was conducted by preparing of different data collection tools, in addition to, obtaining formal paper agreement which was taken in duration one week before conducting the current study**.**

The current study was conducted over a period of one year starting from August 2017 to August 2018.Then the researcher conduct the first interview with the elderly clients, and demonstrate with clients and caregivers the specific objectives of the program are to: the benefits and importance of exercises, the different types of exercises, the reserves should be observed before or during exercise, the side effect of medication, and importance of follow up.

And after that the researcher conducts the research tools: 1^{st} tool was applied before starting the exercise program. And only 3^{rd} part of 1^{st} tool was applied once after starting intervention. Other scale (Muscle Strength Scale, Katz and Akpom scale) was applied before starting the exercises application, and after that was applied 6 times, once per month. And then was applied 3 times, once every two months.

The researcher train the different exercises for each client (individualized sessions) 2 times weekly and train the caregiver to perform the exercise with the elderly clients. The clients were demonstrated and re-demonstrated the exercises in front of the research

her to ensure the well performance. The duration of each exercises was taken about 30- 45 minutes and according to the ability of each client. The researcher was stopped the exercise when occurrence of pain, discomfort in the chest, neck, jaw, arms, Dizziness or syncope, Ask the researcher to stop the exercises, Palpitations or tachycardia.

Muscle strengthening exercises include: 1-Sit to stand exercise for five repetitions.2- Mini squats exercise repeat five times.3-Calf raises exercises repeat five times.4 -Sideways leg lift exercise repeat five times.5-Leg extension exercises repeat five times. 6-Wall press up exercise from 5–10 repetitions.7-Bicep curls exercise repeat five times. Each session included the strength exercises.

The client performs (muscles strength exercises) 2 times weekly for 12 months. The researcher follow the clients once weekly to evaluate the performance of exercise for the clients and caregiver. The researcher design booklet in Arabic language, including exercise to strength of muscles. It was given to each elderly to guide and enrich his/her memory about activities performed in each session.

The researcher gives instruction about the exercise to elderly and caregiver in geriatric homes. The session plan was designed according to physical ability and attention span of elderly. The exercises will be performing according to checklist.

Three tools applied before the implementation of exercise program, Tools (second, third) was applied once monthly for first 6 months and every two months for another six months (the client will be evaluated for one year).

6 RESULTS

Table (1): Reveals distribution of the studied clients according to the Socio-demographic data. The table show that (87.5%) of the study group between (**60:>75** years), Regarding to gender it was found that (61.25%) were male, In relation to education levels it was found that (46.25%) of study group were have basic education, While (20%) of study sample have Bachelor degree.

7 DISCUSSION

ral community, Egypt", that the majority of study group with the mean age was 69.6± 6.2 years. and agree also with **[10],** who carried out a study about " An Exploration Of The Relationships Among Demographics, Risk Factors, Perceived Self-Efficacy, And Fall Prevention Behaviors In Community-Dwelling Thai Older Adults", and reported that the study sample ranged in age from 60 - 79 years old. about more than half of the study group were male that may be due to most of residents in geriatric homes were males because of their needs to care and attention more than females especially after the death of their wives. This result is in the same line with the study by **[11],** who reported in a study about" Knowledge about risk factors

Table 1. Distribution Percentage of Study Regarding toSocio-demographic Data (n=80)

Demographic Data	Study (n=80)	
	No.	%
Age / years		
60:>75	70	87.5
75:>85	8	10
≤ 85	2	2.5
Mean ± SD	67.3 ± 6.4	
Gender		
Male	49	61.25
Female	31	38.75
Level of Education		
Basic	37	46.25
Secondary	27	33.75
Faculty	16	20

for falls and practice about fall prevention in older adults among physiotherapists in Nigeria", that the most of study group were male. and disagree with **[12],** who found that more than two thirds of the studied clients were female.

In relation to educational levels it was found that about less than half of study group were have a basic education. This may be rationalized as in the past there was no interest in high education so, that lead to lack of health awareness about fitness and exercises among elderly people. This finding agrees with **[12]**, who stated that, about less than half of study group have a Primary education. And also supported by **[10]** who reported that, the majority of participants indicated their educational level was primary education.

In the present study, it has been noticed that there were highly statistical significance differences between the knowledge satisfactions of the elderly pre and post the intervention, that due to improvement of elderly knowledge about exercises after intervention. These results were in accordance with, **[13],** who said that there were general improvement of elderly knowledge about exercises immediately after intervention.

In relation to (ADLs), in current study it has been noticed that there were a highly statistical significance differences in improvement of activity of daily living and the percent of dependent elderly decreased significantly after interventions as measured by ADLs through Katz scale, that in the last observation it was noticed that the majority of the study group became independent, the minority of them were partial dependent and there were no one complete dependent. That due to strength of the elderly muscles resulting from exercises training program that reflect to the ability of the elderly to perform ADLs.

These result agrees with **[14],** whose study about " Status of Daily Living Activities among Older People in Maku", they mentioned that the minority were dependent, and the majority were independent in their daily living activities after exercises training program. Our finding in the same line with **[15],** in study about " Strength and ability to implement the activities of daily living in elderly resident in rural areas", reported that the evaluation of ADL's showed that the majority of the elderly can perform their tasks independently.

Also this result validated by [16], who found that there were a significant association between low ADLs and the fall experience. For example, those who were dependent or partially independent of skills of bathing, toileting in ADLs, were significantly likely to fall, compared with those who were independent of these skills. That show highly statistical significance differences in improvement of activity of daily living after exercises training program.

In relation to muscles strength scale (upper – lower) limbs, the present study findings revealed that there was a highly statistical significant in strength of (upper and lower) limbs , that in the end of exercises program there were improvement in the percentage of elderly with normal muscle strength in upper and lower limbs. That reflect the effect of performing exercises training program especially (muscle strength exercises) on strengthen of whole body muscles.

These results agrees with **[17],** who identified that muscles strengthening and balance training as well as stretching exercises are more effective preventing falls, and also found a significant improvement in the balance, strengthening and stretching exercises after exercise intervention.

Another study reported by [18] about" Effects of physical exercise interventions in frail older adults: a systematic review of randomized controlled trials" found that highly statistically significance improvements in mobility and strength after intervention of exercise program. Also **[19],** whose study about " Upper and lower limb functionality and body mass index in physically active older adults" they mentioned that regular physical exercise helps preserve motor function and maintain muscle and bone mass, as well as functionality in older adults.

This result agreed with **[20]**, show that there were highly statistically significant in improve lower-extremity physical function after exercise training program, and they also reported that higher physical activity levels are associated with greater muscle strength. Having in mind that muscle strength is associated with lower risk of disability as well as with better health.

Also supported by **[21],**whom reported that (lower limb) the ankle plantar flexor and knee extensor strengths of older adults improved after performance of exercises training program As people age, the risk of fall increases because a decrease muscle mass leads to atrophy.

Further support by **[22]** who mentioned in their study about "Exercise and fall Prevention: Narrowing the researcetween muscle mass, nutritional status and physical performance of elderly people. Osteoporosis and sarcopenia", found that the relationship between the decline in strength and muscle mass of lower and upper limbs, with the decline of mobility in activity of daily living**.** Also identifid that hand strength correlates with upper extremity strength and general body strength that reflect on general quality of life.

8 CONCLUSION & RECOMMENDATIONS

- The study findings concluded that the elderly exercise program in the form of Muscle strengthening exercises, induce significant improvement in reducing level of dependency in performing activity of daily living among elderly people through strength upper and lower extremity. Finally, the present study has demonstrated that the regular performing exercises for long period enhances the performing of activity of daily living, and stren. [1–15]

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