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# Efficiency of resisted exercise on chronic renal failure with type 2 diabetic patients

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**Abstract**
**Background:** Patients with advanced chronic kidney disease (CKD), especially those on long-term dialysis, often suffer from muscle wasting and excessive fatigue. By enhancing the strength through exercising of their muscles, bones, and joints through exercising, people with CKD can improve their, people with CKD can improve their balance and coordination. This can further prevent them from falling and likewise, protect their independence as they age.
**Purpose:** This study was to find out the effect of resisted exercise on chronic renal failure in type 2 diabetic women.
**Methods:** Forty diabetic women with chronic renal failure was enrolled in this study, their age ranged from 55- 65 years old they were assigned into two groups of equal number: Group(A) participated in resisted exercise (40min, 2times/ week, 12weeks) in addition to medications. Group (B): controlled by their medications only. Blood creatinine and urea was measured before and after the study.
**Result:** Resisted exercise has significant improvement in urea (decrease) and creatinine (decrease) by 9.11% 6.89% respectively.
**Conclusion:** Resisted exercise has significant result on chronic renal failure in type 2diabetic women.

**Keywords:** chronic renal failure, diabetes type 2, creatinine, urea, resisted exercise

## Introduction

Chronic kidney disease (CKD) is set in 5 stages of increasing severity with a decrease in glomerular filtration rate leading to end stage renal disease (ESRD) requiring a treatment of substitution, dialysis or transplantation. CKD is associated with increased cardiovascular comorbid conditions. Mortality in dialysis is far higher than in the general population. It is, therefore at the early stages of CKD that the efforts of screening and prevention of ESRD should be targeted. (Noël A and Landais., 2012) [8].

The kidneys function as blood filters that drain waste products while retaining other valuable blood contents like proteins. If these filters are damaged, they initially may become "leaky," and substances like proteins can seep from blood into urine. At later stages, these filters slowly shut down and lose their ability to filter. When kidney impairment lasts for more than 3 months, it is called chronic kidney disease (Razmaria *et al*., 2016) [9].

Type 2 diabetes (T2D) is common in the elderly and more than half of the people with diabetes are over 65 years old. Elderly diabetic patients have a higher frequency of hypertension, coronary artery disease and chronic kidney disease than non-diabetic elderly patients and the risk of these complications increases with patient age, duration of the diabetes and glycated hemoglobin values. Besides the known classical factors of renal disease progression, can one suppose that the age of onset of diabetes may also affect renal disease progression in elderly diabetic patients. (Bentata *et al*., 2016) [2].

Type 2 diabetes mellitus (T2DM) is associated with an increased risk of progression toward end-stage renal disease and cardiovascular (CV) risk mortality. (Bentata *et al*., 2015) [1]. Patients with chronic kidney disease (CKD) when subjected to resistance exercise (RE) show substantial improvements in many functions, especially those related to the cardiovascular, respiratory, muscular system (Ribeiro., 2013) [10].

## Subjects and Methods

### Subjects

Forty diabetic women with chronic renal failure (grade 1, 2, 3 and 4) were selected for this study from the outpatient-: clinic of El-Menshawy hospital in Tanta, Egypt. Their age were ranged from 55-65years old.

### Inclusion criteria

All patients were
1. Age of the patients range from 55 - 65years.
2. diabetic women (150 -250)mg\dl
3. The main measure of their kidney function (glomemlar filtration rate, or GFR) was be > 15 milliliters per minute (mL/min).
4. Duration of diabetes (minimu\m 7 years)
5. Their body mass index range from 25 -34.9 kg /$m^2$

### Exclusive criteria

1. Men and 55 > age >65.
2. History of surgical interference in kidney.
3. Systolic blood pressure more the 180 mmhg and diastolic More than 100 mmgh.
4. Patient with uncontrolled diabetes.
5. Musculoskeletal conditions that restricted their physical activity.
6. Cardiac and liver diseases.

All patients have received a through explanation of the objectives and procedures of the study and a written informed consent was signed by each patient before participation in the study. Before starting the program, a complete history and physical examination was taken for all patients. This study was reviewed and was approved by the Ethics Committee of Faculty of Physical therapy, Cairo University. The patients were divided randomly into two groups equal in numbers:

**Group (A) study group:** Twenty patients were participated in a supervised resisted exercise program performed 40 minutes, 2 times, per week for 12 weeks in addition to their medical treatment.

**Group (B) control group**: Twenty patients were received their traditional medications only.

**Instrumentations**

**Evaluation tools and equipment's**

Weight and height scale model (ZT -150A, Made in china): was to measure height and weight to calculate body mass index (BMI) of each patient to fulfill the inclusion criteria of the study.

Disposable plastic syringes were used for drawing venous blood sample-polypropylene tubes with EDTA to keep blood samples and kits.

Beck Man AU480 Automated (Made in japan): was to measure blood sugar, urea and Creatinine.

**Evaluation Procedures**

**All patients were subjected to all of the following evaluation protocol**

1. Detailed medical history and physical examination.
2. Anthropometric measurements: weight, height and BMI.
3. Analysis of blood urea and Creatinine. : Sterile syringes, tourniquet and cotton were used to draw the venous blood samples from the ante cubital vein from all patients of both groups to be assayed later for measurement of blood urea and Creatinine before and after the study (i.e.12weeks).

**One repetition maximum evaluation**

**One-repetition maximum** (**one rep maximum or 1RM**) in weight training is the maximum amount of weight that a person can possibly lift for one repetition. (Marchese *et al*., 2011) [7].

All Subjects underwent training on a sample weight for 10 repetition with good form for assist 100%max repetition to complete one full repetition with the maximum weight. Then I calculate 80%of max repetition to avoid muscle fatigue.

**Training equipment**

Weights and dumbles used for patient resistance.

**Training procedure**

Control group (twenty women) received medications only without exercise program, while study group (twenty women) participated in a supervised resistive exercises program exercised for specific part which is left side upper limb muscles(anterior, middle head of deltoid, biceps, triceps, wrist flexors and extensors) Used moderate work load method (80% of one repetition maximum) with their traditional medications.

The exercise program performed 40 min, 2times week for 12 weeks. Medications were taken hours before the exercising at clock to a voids any interfere between the effect of medication and the effect of exercise. (Patients exercise in the morning between 10 to 12 AM.)

The program consists of 3 sets each set consist of 20 repetitions. Duration: of the program about 40 min (five min warm up, and five min cooling down in form of light aerobic exercise), Intensity: moderate intensity 80% 1RM), Frequenc: 2 days / wks. For 12 weeks and Mode: resistive exercise in form of weight training exercise. The patients was asked for contraction every muscle for 1second and relax for 1second,this every set was taken 40seconds and rest between every set one minute every muscle taken about 3minutes, totally program of resisted exercise taken 30 minutes, 5min warming up and at end 5min cooling down then total time of session was 40 min.

**Statistical Analysis**

The data obtained from all forty patients were statistically analyzed for comparison between two groups before and after treatment result. The statistical passage of social studies (SPSS, version22) was used for data processing with no significant difference with p values > 0.05.

**Results**

The main purpose of this study was to find out the effect of resisted exercise on chronic renal failure with type2 diabetic Patients.

**1. General Characteristics of the subject**

**Table 1:** Descriptive statistics for the mean age weight height and BMI of both groups.

| | Group (A) | Group (B) | t_ value | P_ value |
|---|---|---|---|---|
| | Mean + SD | Mean + SD | | |
| Age (year) | 59.6±3.25 | 59.25 ± 3.14 | 0.346 | 0.731 |
| Weight (kg) | 74.8 ± 6.5 | 77.47± 5.44 | | 0.173 |
| Height(cm) | 1.59±0.06 | 1.59± 0.05 | 0.157 | 0.876 |
| BMI(KG\M2 | 29.31± 2.36 | 30.53± 2.34 | | 0.113 |

SD standard diviation P-value: probability level * significant.

**2. Results of the blood urea and creatine of both groups pre and post the study**

**Table 2:** Results of blood creatine and urea of both group's pre and post the study

| | Groups | Pre study | Post study | p-value | % of improvement |
|---|---|---|---|---|---|
| | | Mean +SD | Mean +SD | | |
| Creatinine level | 1 | 1.74±0.24 | 1.61±0.22 | 0.022* | 6.89⇓ |
| | 2 | 1.68 ± 0.24 | 1.66± 0.3 | 0.697 | 1.19⇓ |
| Between groups | P-value | 0.517 | 0.535 | | |
| Urea level | 1 | 41.15±7.47 | 37.4±5.66 | 0.01* | 9.11⇓ |
| | 2 | 38.8± 9.24 | 37.26± 10.1 | 0.254 | 4.12⇓ |
| Between groups | P-value | 0.382 | 0.938 | | |

**Discussion**

The purpose 'of the study was to find out the effect of resistance exercise on chronic renal failure in diabetic women.

The current study was conducted on forty women with type 2 DM and chronic renal failure. Their age ranged from 55-65 years old. They were divided into two groups with equal numbers. Study group participated in a supervised resisted exercise program 40 min, 2 times per week for 12 weeks and controlled by their medications. Group (B) were taken their medications only

**Result**

Resisted exercise has significant improvement in urea (decrease) and creatinine (decrease) by 9.11% 6.89% respectively in chronic renal women. The results come in agreement with (Youssef and Philips., 2016) [12] who found that resistance exercises have a positive effect on decreasing urea, creatinine, glucose, blood pressure, and increasing physical performance and so it can be used safely in DKD patients.

It was reported that In non-dialysis CKD, the addition of resistance exercise to aerobic exercise confers greater increases in muscle mass and strength than aerobic exercise alone (Watson *et al*., 2018) [11].

A review of exercise interventions in CKD determined that introducing a programme of supervised resistance training to the non/pre-dialysis population may improve muscle function and strength, mobility and walking distance and reduce inflammation. (Howden *et al*., 2012) [5] (GOULD *et al*., 2014) [4], suggested that in the pre-dialysis stages of CKD exercise can improve exercise capacity and multiple measures of physical function, which have been shown to decrease as disease progresses. Also suggests that aerobic exercise in particular, confers protection against the decline in cardiac function and the development of cardiovascular disease through the improvement of both traditional and nontraditional risk factors. Also suggests that resistance training can increase strength muscle mass and function. Interventions capable of improving muscle Mass this make protection against the development of cardiovascular diseases, therefore, future research should focus on the efficacy of combined aerobic and resistance exercise.

Also, (Gollie *et al*., 2018) [3] was showed that Progressive resistance exercise improved skeletal muscle hypertrophy of the lower extremities, muscular strength and health-related quality of life in end-stage renal disease

**Conclusions**

I was concluded that resisted exercises had significant effect on chronic renal failure in diabetic patients.

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