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EFFECT OF EIGHT WEEKS STRENGTH TRAINING PROGRAM ON PINCHGRIP AMONG PATIENTS WITH DIABETIC NEUROPATHY

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ABSTRACT

Background of the Study: Elvis I. Agbonlahor, Ph. D. & Adebisi I. Hammed M. Sc. 2016 conducted research, which concluded that Pinch grip strength training improves hand function in diabetic neuropathy. **Aim:** The aim of the study was to assess the effect of eight weeks strength training program on pinch grip among patients with diabetic neuropathy.

Objective

• To assess the impact of strength training on pinch grip strength using a pinch gauge.

• To assess the effect of the training program on overall grip strength of the individuals with diabetic neuropathy.

Methodology: This study consist of 30 patients (both male and female) diagnosed with diabetic neuropathy and were divided into two groups: Group A (Experimental and Group B (control group) consisting of 15 samples each. Group A performed pinch grip strengthening exercises focused on improving pinch strength and Group B performed conventional exercise focused on pinch grip strength for a duration of 30 minutes, 5 times a week for 8 weeks. **Outcome Measures:** Grip, hand function, pinch grip strength. **Result:** The pre and post test values of Pinch gauge proved that there was a significant improvement in Pinch grip among diabetic neuropathy patients.

KEYWORDS: Diabetic Neuropathy, Strength Training, Pinch Grip Strength, Grip Strength, Hand Function.

INTRODUCTION

Neuropathy, a common complication of diabetes mellitus, is generally considered to be related to duration and severity of hyper glycemia and causing Hand dysfunction in patients with Diabetic Neuropathy.[1] Diabetes mellitus is a chronic disease that causes serious health complications including renal (kidney) failure, heart disease, stroke, and blindness. Peripheral nervous system brings information to and from the brain and spinal cord to the rest of the body.[2] Peripheral neuropathy (PN) occurs when damage occurs at one (mononeuropathy) or multiple (polyneuropathy) nerves. Neuropathy, a common complication of diabetes mellitus, is generally considered to be related to duration and severity of hyperglycemia. However, it may also occur acutely even with hyperglycemia. usually more than 50% of patients with duration of diabetes of 25 years or more are affected, making it as one of the most common disease of the nervous system.[3,4] One of the largest published series reported a prevalence of 7.5% even at the time of diagnosis of diabetes.[5] About 60 to 70 percent of people with diabetes have some form of neuropathy. People with diabetes can develop nerve problems at any time, but risk rises with age and longer duration of diabetes.[6,7] The highest rates of neuropathy are among people who have had diabetes for at least 25 years Diabetes mellitus (DM) is the most common cause of neuropathy in the western world.[8]

Hand function commonly affected in diabetic neuropathy studies show that, the grip and pinch strengths were significantly lower in diabetic patients than the no diabetic controls and low hand strength was found to cause functional disability of hand in our type 2 diabetic patients. Hand grip strength test values were significantly lower in the diabetic group compared with the control group.[12,13] Key pinch power value was significantly lower in the diabetic group.[14] The basic principles of strength training involve a manipulation of the number of repetitions, sets, tempo, exercises and force to cause desired changes in strength, endurance or size by over loading of group muscles.

The hand of human is the effector organ of the upper limb as it is capable of performing countless actions including prehension, precision, adaptation, exploration, perception and manipulation.[11,2] The hand is not only a motor organ but also a very sensitive and accurate sensory receptor, which feeds back information essential for its own performance.[13] The hand is greatly affected by diabetic musculoskeletal complication. Adequate muscle power is

required for optimum productivity while decreased muscle strength is a predictor of physical limitations Without adequate grip, pinch and forearm strength, patients with diabetes stand the risk of developing hand and forearm problems that could result in reduced performance.[14,5] Often overlooked or taken for granted, the strength of one's grip plays a key role in injury prevention and overall strength development.[6] Furthermore, grip and pinch strength testing are commonly used to evaluate hand function for disability ratings and to assess responses to various forms of therapy.[8] Reduced grip and pinch strength was related to disability of the hands and suggested that negative influence of diabetes and obesity on muscle quality could all contribute to poor muscle function and hand weakness.[9] It was stated that weakness of hand muscles is a symptom of large number of pathologies which could result in loss of hand function. Grips reflect the strength generated by the contraction of the various arm and hand muscles involved in the activity of the hand.

Fig. 1: Diabetic Neuropathy.

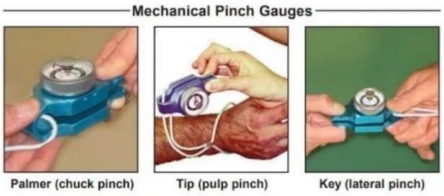


Fig. 2: Mechanical Pinch Gauges.

AIM OF THE STUDY

The aim of the study was to assess the effect of eight weeks strength training program on pinch grip among patients with diabetic neuropathy.

OBJECTIVES OF THE STUDY

- To assess the impact of strength training on pinch grip strength using a pinch gauge.
- To assess the effect of the training program on overall grip strength among individuals with diabetic neuropathy.

RESEARCH DESIGN AND METHODOLOGY

An experimental study design was conducted with 30 samples within the age group ranging between 40 and 60 years who fulfilled the inclusion and exclusion criteria.

INCLUSION CRITERIA

1. The subjects were included by the evaluation of pinch grip strength by a pinch gauge tool.

2. The subjects who have been diagnosed with diabetic neuropathy.
3. The age group of 40 to 60 years.
4. Both male and female gender were included in this study.

EXCLUSION CRITERIA

1. The subjects have the history of upper limb nerve injury.
2. The subjects with secondary complications of diabetic neuropathy.
3. Other neurological disorders patients were excluded.

OUTCOME MEASURES

1. Pinch grip strength..

PROCEDURE

Sample selection was done based on the inclusion and exclusion criteria. Consent form was received from the subjects in written format. Study consists of 30 subjects ranging within the age group between 40-60years. They were divided into 2 groups, namely Group A and B.

GROUP- A: Experimental group- 15 SUBJECTS

GROUP- B: Control group -15 SUBJECTS

INTERVENTION

EXPERIMENTAL GROUP (GROUP A)

Key pinch (lateral pinch): The participant was comfortably seated or upright, tested the arm at the side with elbow flexed 90°, palm facing inward, pinch gauge between flexed PIP joint of index finger and thumb, the researcher stood in front of the participant to the side stabilizing the pinch gauge and then made the participant to squeeze, hold and release the pinch gauge.

1. Palmer pinch (chuck pinch): The participant comfortably seated or upright, tested the arm at the side with elbow flexed 90°, palm facing downward, pinch gauge between thumb and the index and middle fingers.
2. Tip pinch (thumb-index pulp pinch): The participant comfortably seated or upright, tested the arm at the side with elbow flexed 90°, palm facing downward, pinch gauge was between thumb and test finger without interference of other fingers.
3. Spring Hand grip dynamometer: Participants were at their side with their elbow in 90 degrees of flexion and was instructed to squeeze as hard as they could for 3 seconds.
4. Squeeze ball: Squeeze ball was given to the patient hand and asked to squeeze the ball and hold for 10sec count. Exercise should be performed in both the hands alternatively.

CONTROL GROUP (GROUP B)

1. Towel exercise: The participant comfortably seated or upright, tested the arm at the side with elbow flexed 90°, hold the towel with the hand, pinch the towel between thumb and the index finger, hold it for 5 to 10 seconds, release and repeat for 10 to 15 repetitions.
2. Rubber band exercise: Wrap the rubber band around the fingers and ask the patients to open and close the fingers, hold it for 5to 10seconds, release and repeat for 10 to 15 repetitions.
3. Weighted object: Hold the weighted object, between thumb and the index finger, hold it for 5 to 10 seconds, release and repeat for 10 to 15 repetitions.
4. Cylindrical object exercise: Hold the cylindrical object, between the fingers, pinch the object firmly and hold the cylindrical object for 10seconds, release and repeat for 10 to 15 repetitions.
5. Pen or pencil exercise: Place a small object like pen or pencil in between the thumb and index finger and hold for 5 to 10 seconds, release and repeat the 10 to 15 repetitions.

DATA ANALYSIS

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (spss) version 24.0. Paired t-test was adopted to find the statistical difference within the groups & independent t-test was adopted to find the statistical difference between the groups.

Table: 1 Key Pinch-Pre-Test and Post-Test of Key Pinch of Experimental Group A and Control Group B.

KEY PINCH		MEAN	SD	T-VALUE	P-VALUE
EXPERIMENTAL GROUP A	PRE TEST	8.56	2.07	10.52	<0.0001
	POST TEST	10.70	1.55		
CONTROL GROUP B	PRE TEST	5.98	0.54	17.06	<0.0001
	POST TEST	7.31	0.43		

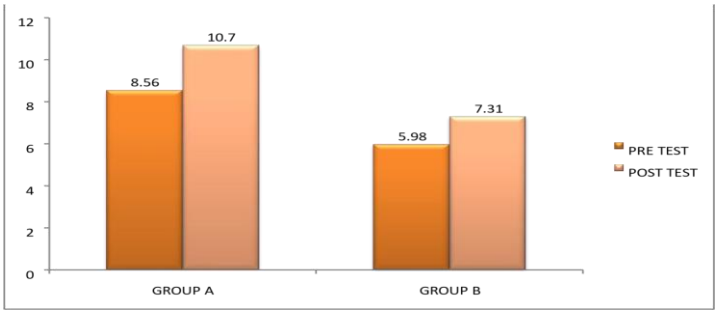


Table: 2 Palmar Pinch- Pre-Test And Post-Test of Palmar Pinch Experimental Group A And Control Group B.

PALMAR PINCH		MEAN	SD	T-VALUE	P-VALUE
EXPERIMENTAL GROUP A	PRE TEST	10.27	0.58	36.37	<0.0001
	POST TEST	12.48	0.70		
CONTROL GROUP B	PRE TEST	7.73	1.88	10.04	<0.0001
	POST TEST	9.18	2.04		

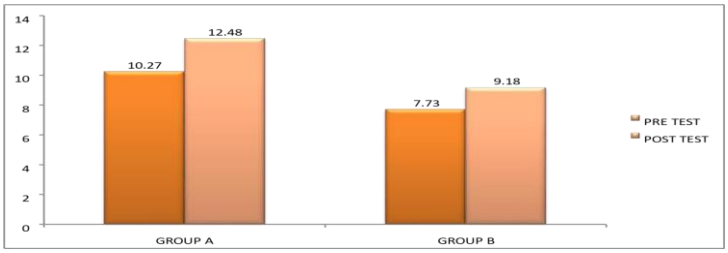
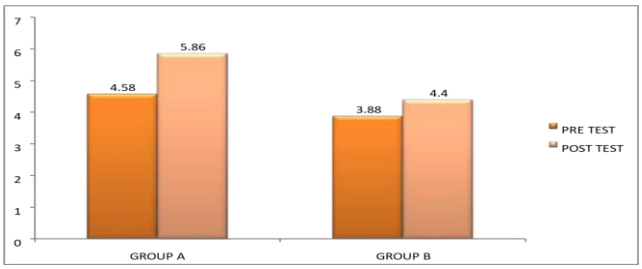


Table: 3 Pre-Test And Post-Test of Tip To Tip Pinch Experimental Group A And Control Group B.

TIP TO TIP PINCH	MEAN	SD	T-VALUE	P-VALUE	
EXPERIMENTAL GROUP A	PRE TEST	4.58	0.70	16.00	<0.0001
	POST TEST	5.86	0.63		
CONTROL GROUP B	PRE TEST	3.88	0.50	31.55	<0.0001
	POST TEST	4.17	0.51		



RESULT

The key pinch post -test(10.70) value of Group A was higher than the post-test (7.31) values of Group B which showed a highly significant improvement in the post-test of Group A.

The palmar pinch post-test (12.48) value of Group A was higher han the post-test (9.18) values of Group B, which showed a highly significant improvement in the post-test of Group A.

The tip to tip pinch post-test (5.86) value of Group A was higher than the post-test (4.17) values of Group B, which showed a highly significant improvement in the post-test of Group A.

DISCUSSION

The purpose of the study was to assess the effect of eight weeks strength training program on pinch grip among patients with diabetic neuropathy. The major goal was to improve the pinch grip strength among patients with diabetic neuropathy. The study was conducted with 30 samples, the Group A (experimental group) was pinch grip strengthening exercises and Group B (Control group) was given conventional exercise. In Group A, the key pinch value, palmar pinch value and the tip to tip pinch value of the post-test scores were greater than the pre-test scores. Elvis I. Agbonlahor, Ph. D. & Adebisi I. Hammed M. Sc. (2016),The findings of the study showed that ST programme had significant effects on handgrip and pinch strength of T2DM patients.

CONCLUSION

The study concluded that the eight weeks strength training program on pinch grip was effective among patients with diabetic neuropathy.

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