Comparison of hand grip strength in cardiac patients and healthy individual through Dynamometer

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Abstract:

Number of daily activities of life embodied oblige significant amounts of grip strength. This study was designed to compare the grip strength in cardiac and healthy individual. In old age people low grip strength and chronic disorder patients after myocardial infraction and angina more decline.

Objective:

To compare grip strength of dominant and non-dominant hand in cardiac patients and healthy individual through dynamometer.

Method:

Study was done to determine the hand grip strength of cardiac patients and the healthy individuals, of the dominant and non-dominant hand.T-test were directed from the specified groups to get results .In cross sectional study 40 individuals of participants were take part in this study 20 suffering from cardiovascular disease typically from myocardial infraction and angina ,12 male(52.2%) suffering myocardial infraction and no angina patient were not found in male while in female 5 myocardial infraction (29.4%) and 3 Angina (17.6%) and 20 participants from age-matched healthy individual group in which 11 (55%) males and 9 (45%)females .The mean value was obtained after taking the readings of grip strength of both dominant and non-dominant hand with the help of Jammer Dynamometer This method was repeated three times in order to obtain and exact mean value of both hands.

Result:

In comparison the dominant hand grip strength of cardiac patients and healthy individual (54.28 ± 27.75) there is significant difference in the mean values of both groups and the p-value is significant whereas in the non-dominant hand grip strength between there is no significant difference between two groups.

Conclusion:

Grip strength is less in cardiac patients also declines relatively to age but in cardiac patients more decreased as compared to healthy normal individual in all genders.

Keywords:

Grip strength, dominant, non-dominant, cardiac patients

Introduction:

Grip strength is the capacity of a muscle to develop maximum contractile force in opposition to a resistance in an isolated contraction. Muscular endurance is the ability of a muscle group to utilize submaximal force for expanded interval(1).Grip strength is a quantity of the supremacy of the hand which is liable for hang the weights , for sit to stand position ,up from of a chair, grasp to hold the glass or cup, bus and train travelling or taking a bath. The grip of hand can be determined by on the muscles of hand and forearm and, subsequently the grip strength forms a closed scheme of forces. Sufficient range of motion in the shoulder joint is desired for accomplishment above the head to get items down from the high cupboards, settle the curtains, or hang out laundry and also for getting the back of the neck, changing of clothes and for hair brush .The grip strength is mostly required for toothbrush. Lesser of joint range is common in old age and pays to troubles with the essential tasks of daily activities of life (2).Astounding is acknowledged about strength of skeletal muscle in cardiac patients suffering from myocardial infraction and angina , found a significant reduced in grip strength of cardiac disorders patients as compared to healthy individual (3).However, nearby any disease definite modification in muscular composition. The important contributor to muscular strength may be the physical activity of patients, it is well known physical actions lead to morphological edition of skeletal muscles(4).Dynamometer is used to check out the grip strength of hand .These instruments can record forces produced by concentric ,eccentric, isokinetic, and isometric muscle contractions. They are highly sensitive, reproducible, and contribute valuable data. However, they are typically limited to research settings and large institutions(5). They are cumbersome, time consuming, expensive, and lack portability. They can measure only a few limited muscle groups. Few have proved to be practical in busy clinical practices(6).They are relatively inexpensive, simple to use, and practical for busy clinical settings. They still have drawbacks, however, particularly an absence of large sample normative isometric data with age and gender subsets and available normative data for only limited numbers of upper extremity muscle groups. This study was designed to provide an initial data base of dominant and non-dominant grip strength of cardiac and healthy individuals at age of 50-75 years.(7).Cachexia is a tissue wasting syndrome which is related to the chronic disorder of heart chronic heart failure , and the accompanying with significant disorder and demise rate. But, there is quiet no broadly accepted definition of cardiac cachexia. In the past maximum clinicians used low body weight to describe cachexia, but a constitutionally less body weight should not spontaneously be eligible a patient as cachectic.(8) Physical and biological changes in the structure and function of muscle action as a result of aging. Physically mass of the muscle decreases while increasing an age. Sarcopenia is the steady loss of skeletal muscle mass, strength of the muscle , and quality of the muscle that take place with evolving of age .(9) Several dissimilar mechanisms have been proposed for the pathogenesis of skeletal muscle deteriorating in cardiac disorder patients. It has been suggested that malnutrition, malabsorption, dysfunction of metabolism , imbalance of catabolic and anabolic and the loss of nutrients are important for the development of muscle wasting(10) .There is increasing evidence that reduction of grip strength of hand in old age people is related with adverse outcomes including morbidity (11) higher rates of fracture and disability (12) , long term

stay in the hospital. (13) and mortality(12) Ageing is related by an accrual of prescription of medicine , and the mostly chronic heart disorder patients take more than four or five medicine on daily basis and these is related to polypharmacy. New choice of drugs and medication , lower thresholds for treatment and inappropriate prescribing also contribute to decrease grip strength of hand .(14) Circuit weight training is commonly used by healthy individuals for improving grip strength and muscular endurance.(15) Myocardial infraction and angina concomitant with coronary artery disease and cardiac disorder can lead to exertional dyspnea and hyperventilation which may boundary exercise capability(16) Patients of myocardial infraction, angina and chronic coronary artery disease can limit their physical activities because of exercise fanaticism . The results in a cycle of inactivity of daily works and physical deconditioning and, consequently, daily activities, and life of quality are condensed.(17)

Methods:

A comparison study was conducted in the different hospitals of Lahore. Forty individuals were take part in this study, in which both male and females are involved. 23 males and 17 females take part in this cross sectional study was included myocardial infraction and angina patient and healthy individual without any cardiac issue, exclusion criteria is the fracture, tumor, rheumatoid arthritis and post op patients. In cross sectional study 40 individuals of participants are take part in this study 20 suffering from coronary artery disease mostly from myocardial infraction and angina ,12 male(52.2%) suffering myocardial infraction and no angina patient in male while in female 5 myocardial infraction (29.4%) and 3 angina (17.6%) and 20 participants from age-matched healthy individual group in which 11 (55%) males and 9 (45%)females. Dynamometer is used in this study to check the grip strength, Jamar hydraulic hand dynamometer has been used for over 40 years to measure grip strength. This is easily read to display and checkout the average standard deviation .Jamar dynamometer measure the grip strength in lbs. We take measurements in the lbs. and take 3 readings of both dominant and non-dominant. According to American Society of Hand Therapists has proposed a standard arm positioning for hand grip strength testing. It is suggested that the patient should be seated with his shoulder adducted and neutrally rotated, the elbow flexed at 90" and the forearm and wrist in a neutral position(18).All assessments received ethical approval and all participants gave informed consent.. Data was analyzed by SPSS version 21.0

Results:

In this study 40 subjects were studied Average age of the participants was 62.08±7.63years. Among them 23(57.5%) were male and 17(42.5%) were female. Average age of male was 60.65±7.37years whereas mean age of female was 64.11±7.75years

Table.1

Among subjects, 20(50.0%) were with Cardiac disease and others were normal. Among cardiac patients 17(85%) were with Myocardial infarction and 3 were with Angina pain. 51(2.5%) were suffering from cardiac diseases from 0-2yeras, 7(17.5%) were suffering from 2-4 years and 8(20.0%) have cardiac issues from 4-6 years.

Table.2

Dominant hand grip strength of subjects with cardiac disorder was statistically significantly different from normal subjects (p-value 0.032). Non dominant hand grip strength of normal subjects was more than normal but the difference was not statistically significant (p-value 0.063).

Table .3

On average dominant hand grip of cardiac patients was 54.28±27.75lbs in cardiac patients and in normal patients it was 74.78±30.33.

Table.4

Average strength of non-dominant hand in cardiac patients was 54.11±26.46 whereas in normal it was 71.03±29.25lbs.

Dominant hand grip strength of subjects with cardiac disorder was statistically significantly different from normal subjects (p-value 0.032). Non dominant hand grip strength of normal subjects was more than normal but the difference was not statistically significant (p-value 0.063).

The normal individuals have good hand grip strength, results shows that the muscular strength is reduced in cardiac disorders .In dominant hand grip strength in cardiac patient is less as compared to normal healthy individual .while as according to age the muscle strength is reduced. The dominant hand grip strength is lower as compared to normal age related persons .The non-dominant hand grip strength in which cardiac patients and healthy individual, the normal individuals have good hand grip strength, results shows that the muscular strength is less reduced in cardiac disorders patients and healthy individual.

Discussion:

In this study, shows significant difference in cardiac disorder and healthy individual group in dominant hand grip strength was significantly less in cardiac disorder patients when associated to healthy individual although not significantly in the non-dominant hand grip strength, between both groups. Moreover, the reduce grip strength in cardiac patients in dominant hand of myocardial and angina patients a significant influence but not a non-dominant muscle hand grip strength ,both in cardiac disorder patients and healthy individual hand grip strength declined strongly related with the age. The present study was performed to evaluate the grip strength of hand by using Jammer Dynamometer. This methodology is considered the most of the accurate measurements of hand grip strength in cardiac patients and healthy individuals. Gayda et al(19) examined the muscle strength of those patients whose effected by from coronary artery disease and healthy control subjects. They found approximately identical absolute values of muscle strength .The authors determined that there is no difference exists between muscle strength of cardiac disorder patients and healthy controls .This study was conducted on only men ,post op and invasive procedures and prior to myocardial infraction patients while as in the current study non-invasive patient taken in the study and results shows the hand grip strength of cardiac patient will be less .Baum K et al(20)Qualitative variance in lower limb leg muscles and upper limb arm muscle torque, lower limb leg muscle force was ominously less in cardiac patients when compared to healthy individuals while no difference could be identified in the arm muscles . This author states those people who have history of athlete their significant difference found in arm muscle shows less strength, but in the current study the dynamometer find the new consequences of grip strength of cardiac patients is less grip strength in dominant hand while as there is less difference in non-dominant hand. The reductions in skeletal muscle strength with the age , or in line with other cross-sectional verdicts.(21) . These reductions in hand grip strength initiate mostly from two bases. Biological aging through itself and a reduction of daily physical activities of life with the increasing of age. Regular provocations are necessary to maintain muscle strength from bed rest teachings.(22),immobilization of the patient and completely on the bed (23) .During daily deeds, muscles of arm are normally wide-open to dissimilar jobs. Arm muscles have to lift weight, eating, gripping n more tasks, arm muscles nearly serve for additional sophisticated tasks. Furthermore, muscles of arm are usually displaying to perform daily routines during throughout the life span. Consequently, in order to roughly discriminate the encouragement of biological aging and physical inactivity of the age-related reduction in muscular strength, arm flexor muscle may help as an indicator of ageing effects (24)

Conclusion:

The tenacity of the study was to determine the grip strength of hand in cardiac patients and healthy individual, the results shows the grip strength decreased in cardiac patients and healthy individual but more declined in cardiac patients as compared to healthy individual of dominant hand, despite the fact as non-dominant hand grip strength is not significant results p.005

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Table.1

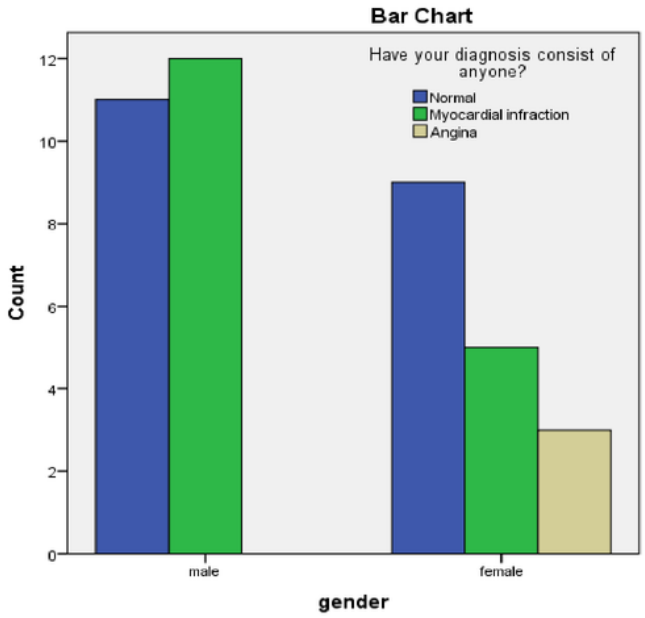

Table.2

	Group	*Mean*	*Std. Deviation*	*p-value*
Dominant Grip strength	Cardiac Disorder	54.28	27.75	0.032*
	Normal	74.78	30.33	
Non dominant Grip strength	Cardiac Disorder	54.11	26.46	0.063
	Normal	71.03	29.25	

p-value is significant at 0.05

Table.3

Dominant hand grip	Cardiac disorder	Healthy group
N	20	20
Mean	54.2830	74.7820
St. Deviation	27.74820	30.33103

Table.4

Non-dominant hand grip	Cardiac disorder	Healthy group
N	20	20
Means	54.1145	71.0265
St. Deviation	26.45968	29.25050

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