"THE EFFECT OF STRENGTH TRAINING FOR CORE MUSCLES AND LOWER LIMB MUSCLES IN POWER LIFTER"

[1]Dr. Dhaval kolcha, [2]Dr. Dharmang vyas

[1] MPT,

[2] Professor of Parul university

Parul institute of physiotherapy

Parul University, Vadodara.

ABSTRACT

The purpose of this experimental study was to develop a functional capability by regulating strength training and to compare the difference in the performance of power lifters. Hereby, emphasis had been put mainly on strengthening the the core and lower limb musculature. 40 gym power lifters from Vadodara district were selected for the study; of which two groups were formed using random sampling method.The members from the control group had to perform regular gym exercise while that of experimental group has and additional exercise protocol alongwith regular exercise followed for 3 days. It mainly included medicine ball exercise, crunches, squats, walking lunges and other core strengthening exercise. The outcome measurement were checking core muscle strength using sphygmomanometer and vertical jump test. Moreover, the result indicated satisfactory performance improvement in the Vertical Jump Test as well as Sphygmomanometer Test in the Experimental group when compared to Control group. However, the hamstring muscles were found to be improved most strengthwise with when compared with gluteus and lower back muscles. To conclude, introducing lower limb and core musculature strength training in daily exercise protocol of power lifters can help them improve their performance drastically. Nevertheless, the core is the center of most kinetic chains and more detailed study regarding its training is recommended.

INTRODUCTION

Power lifting is listed as a strength sport. It is emerged from an ancient sport named "odd lifts". It comprises of three different lifts with three attempts at maximal weight: Squat, Bench Press & Dead lifts. It requires the athlete who attempts a single lift with maximal weight of barbell loaded with weight plates.

1) Dead lifts:

A type of lift where the weight is picked up from the ground and upto the level of hips followed by lowering it by controlled efforts to the floor by the power lifters. Dead lifts increases head to toe strength. It is one of the best weight training exercise. Dead lift stretches the back muscles. i.e. upper & lower back, hamstrings & gluteus. Dead lift is a resistance training exercise that lift "Dead weights". Dead weight is referred to the energy free weight that is it does not have any momentum. Dead lift is an exercise which is considered very simple. It replicates the simple daily activity of bending forward in order to lift certain object from the floor. Similar kind of

movement was observed where the athlete lift weight that are on grounds.(2)

Types of Dead lift

1) Conventional deadlifts:

The conventional deadlifts primarily uses gluteus when lifting the weight of the flour.The conventional dead lifts are performed as follows: The subject positions his feet hip width apart. The toes must be turned slightly anterior and remains beneath the bar which is resting on the floor. The subject bends down in order to grasp the bar. The handgrip should be shoulder width apart. While arching the lower back, the subject lifts his chest and extends his knee and hip completely to lift the bar from floor and assumes an upright position. He has to hold this position for a second or two before putting back the bar on floor by funding his knee and pushing the hips backward.(2)

4 Key points for Deadlifts

A) Keep arms straight and elbow locked.

B) Dragthe chin forward to the ceiling when initiate to lift the weight.

C) Press down on your heels.

D) Elevate your chest.

2) Romanian deadlifts:

It begins with the barbell held in hand while the subject is in standing position. Then, the subject is asked to crook down the hips to its maximum range available in order to achieve the lowest point possible. This dead lift creates comparatively more stress on hamstrings and lower back than conventional dead lifts. The Romanian dead lift differs from traditional one because in the latter the knees are flexed and the maximum muscles work is carried out by quadriceps and gluteus.
To do Romanian dead lifts subjects stands with the feet hip width apart holding the weight at level of thigh and grasping the bar shoulder width apart. The subject crook his knee and pushes his buttock backwards so that he can hinge his hips forward and can lower the bar in front of his legs as much as allowed by flexibility to force the hips forward and obtaining standing position. Romanian deadlifts will improve strength and flexibility in the hamstring and gluteus.(2)

3) Sumo deadlift:

It strengthen quadriceps,gluteus, hamstrings and other muscles or the posterior chain.

It is best to use it as a rehabilitation exercise after suffering from back trauma. The difference between conventional deadlift and sumo deadlift is the setup of lifter's legsand hands. When the bar is grasped by the subject's handsand legs beneath it, the form is considered "sumo".

To do sumo deadlift the position of foot is absent twice the shoulder width , the shins line up with the rings and the barbell. Toes should be pointed outwards. The hips are pushed upward so that the position of thighs remains above parallel to the floor slightly. The neutral position with slight extension was maintained by lumbar spine while hands hold the bar at shoulderwidth apart.

4) Hex or trap bar deadlift:

Performing hex bar deadlifts helps keep the weight dose to the lifters centre of gravity and allows the lifter to remove more up right

during the movement. Which could decreased the risk or injury the lower back.

Trap bars catch a hexagon shape with sleeves or the end that let you load weight, and they have handless an either side that allow you to grip the bar with neutral grip. Trap bar deadlift develops the gluteus, hamstring and back. The main benefit is that they put less stress on the lumber spine.

To do hex bar deadlift, subject steps into the centre of trap bar, and starts to lower himself by crooking the hips and knees. Ensuring the spine position to be neutral, subject grabs the handles of trap bar keeping arms completely straight. After that, he begins to pull, until the knees and hips are fully extended and subject stands completely upright. Reverse the same movement as the subject came up.

5) Snatch grip deadlift:

In this deadlift the hands take on wider grip. It is the type of Olympic lifting. It mainly works on the hamstrings and it is more comfortable for the lower back.

To do snatch grip deadlift use a wide grip to hold the barbell. The arms of the subject should remain extended during the whole procedure of movement and feet should be faced turning out. Arms should form down ward pointing 90 degree angles. Dip the hips back until subject is almost in squat position and grip the bar . The subject than slowly rise while grasping the bar and keeping his back straight. He lowers the bar. Injuries occur to power lifter while dead lift. The dead lift implements the lifting of barbell from the floor until the subject obtains erect standing position. During the competition, the lifter grips the bar with arms straight and position being erect standing upto the time referee givres command to lower it down.

The injuries that occurs must be due to lifting heavy load in excess, working in wider range of motion while exercising, insufficient resting between the power lifting exercise, faulty lifting techniques. Cervical spine injury this injury happened because of poor spinal posture, heavy load, and multiple repititions of flexion and extension. This injury involves both soft tissue and joints structures such as disc and ligaments. The knee injuries occurs in deadlift because of faulty techniques.

There are some resource why your knee hurt while dead lifting. A wide stance in excess increase the compression forces, having too low of a starting position, keeping the weight far ahead of body, fast lifts using bar, early locking of knees increases force on patella, forgetting to lock your knee while performing and reaching at top of the deadlift. A rapid descent also generates too much strain and force on ligaments.Moving knees in front before initiating the task of putting the bar down. Incorrectly done deadlifts put too much stress on lower back leads to a painful sprain on strain. A strain is the result of the lower backs muscle fibres being overly stretched or torn. A sprain occurs when ligaments are ripped from their connection point. Both leads to severe lower back pain, stiffness, decreases mobility and muscles spasms.

Reasons of back injuries are bending over too far at the hips just before lifting, folding the bar away from your body,hyper extending the lower back while on the top of the movement. Some weight lifters who train their chest excessively, often suffer from shoulder primary shoulder impingement because of overuse of shoulder and back muscles. Also, the rotator cuff muscles has important stabilising role in deadlift motion which shows that using excessive weight can cause rotator injury.

OUTCOME MEASUREMENT

The neuromuscular function of lower limb assess the bilateral strength asymmetry. It is described as the relative difference in strength between the two legs The sports medicine widely rely on asymmetry of bilateral knee joint muscles in order to decide the extent of functional deficit following knee injury and/or surgery for monitoring the improvement observed due to sport rehabilitation programs.

It also uses the same entity for decision making whether to send an athlete back into the competition. Among these exercise vertical jump test is considered most reliable and valid one by a study that proves its correlation with other outcomes of strength asymmetry bilaterally. It is also specific in deciding statistically cut-off values for the strength asymmetry of both lower limbs in male power lifters. According to article (LucasAraujo Castro e Souza et.al) In general, the modified sphygmomanometer test MST demonstrated satisfactory criterion related validity , test and inter- rater reliabilities while assessing the strength of lower limb muscles and trunk muscles in patients suffering from chronic stroke. The results indicated adequate strength values in majority of muscles after one trial only. (12)

NEED OF THE STUDY

Some researchers have shown benefits of medicine ball exercise in different sports.

Only few limited studies have addressed effect of medicine ball exercise among power lifter.

This study aims to throw some light on whether medicine ball exercise is beneficial in improving lower limb strength and core strength in power lifter.

AIMS AND OBJECTIVES

AIM:

To determine the benefits and effectiveness of medicine ball on lower limb strength and core strength among college level power lifters.

OBJECTIVES:

- To determine the changes in lower limb strength in college level power lifter by medicine ball exercise.
- To find out the changes in core strength in college level power lifter by medicine ball exercise.

RESEARCH HYPOTHESIS

NULL HYPOTHESIS:

$H_{(01)}$-There will be no significant change in lower limb strength and core strength in college level power lifter by medicine ball exercise.

EXPERIMENTAL HYPOTHESIS:

$H_{(1)}$ -There will be significant change in lower limb strength and core strength in college level power lifter by medicine ball exercise.

REVIEW OF LITERATURE

a. Ulrika Aasa, KajsaGilenstam, and Lars Berglund, 2018 conducted study on "Prevalence and consequences of injuries in Powerlifting" They told that power lifters are very much prone to injuries with equal frequency found among males and females but the location of injury was observed different among both the groups. However, these injuries should not stop power lifters to train and compete furthur, but the training protocol must be changed in order to gain recovery and pace back for competition. The reason behind the injuries is still not understood fully; Still, it is likely to happen that the management of training loads and optimization for the lifting technique during the bench press ,squats, and dead lift.

b. Michael Hales 2010 in his article, "Improving the Deadlift: Understanding Biomechanical Constraints and Physiological

Adaptations to Resistance Exercise." has put some focus on the point The article focusing on the point that in order to maximize and better performance of deadlift, designing an individual training program according to requirements consisting of heavy resistance exercises. He also believes that human body has a lot of trapped strength but the real challenge is identifying the same and using those as a hidden assets for selves. He concluded that with continuous practicing and resistance trainings, the body will comfortably adapt the capability of performing complete coordination, synchronization, and will learn the new muscle fiber firing pattern, which can contribute to enhance muscle's force production. In general, humans have limited access to the amount of force which they can produce using the actions made by them. To overshadow this drawback, an individual will try to drop the extra external forces by variating body movements and posture. The real paramount is to identify the suitable lifting style and using proper technique for taking the deadlift performance at peak.

It is the first thing to accomplish before initiating any training protocol. The conventional and sumo deadlifts have their own pros and cons associated with their lifting mechanics. Many time, the disadvantages of the particular lifting style is more impactful than the benefits, so it becomes obvious that the subject should select the style that help himself according to his physical characteristics.

Finally, high tensile stress is explicated on posterior ligaments of spine while performing maximum dead lifts. This could result in remarkable injury as well. So, dead lifts should be performed undertaking atmost precautions and should be executed technically that too on limited basis.

c. Lucas Araújo Castro e Souza, Júlia Caetano Martins, LuciFuscaldiTeixeira-Salmela, Eliza Maria Lara, Juliana Braga Moura, Larissa Tavares Aguiar, and Christina Danielli Coelho de Morais Faria-2014. "Validity and reliability of the modified sphygmomanometer test to assess strength of the lower limbs and trunks muscles after stroke." Generally,the modified sphygmomanometer test MST demonstrated satisfactory criterion related validity , test and inter- rater reliabilities while assessing the strength of lower limb muscles and trunk muscles in patients suffering from chronic stroke. The results indicated adequate strength values in majority of muscles after one trial only..

d. Vanessa R. Yingling, Dimitri A. Castro, Justin T. Duong, Fiorella J. Malpartida, Justin R, Usher and Jenny O- 20 April 2018. "The reliability of vertical jump tests between the Vertec and My Jump phone application." They concluded that though vertec and my jump application was selected for comparison, for measuring the vertical jump height the my jump aaplication was found more reliable in terms of affordability, ease of use and portability but, practitioners must be known to absolute VJ jump values for Vertec and My Jump, respectively,it will differ significantly for everybody (even the use of the "Peak Power" regression equation that consist body weight will decrease this difference). Thus, irrespective of whether the practitioner chooses to use Vertical or My Jump, they prefer that the selected aspect should be used exclusively during repeated measures within-subject testing of individuals or groups.

e. Claudionor Delgado1, José Fernandes Filho2, Fernando Policarpo Barbosa3 and HildeamoBonifácio Oliveira.-2004."Use of the sphygmomanometer in the evaluation of the knee joint flexor and extensor muscle strength in militaries."They proved that militaries showed differences in strength among posterior muscular groups and knee joint anterior at the various angles that has been studied. The procedure used was found appropriate for the strength qualitative evaluation.

f. Aarti Welling, Peeyoosha Nitsure-2015. "Comparative study between mat, Swiss ball and theraband exercise on abdominal girth.**"** The result of 5 week exercise program involving mat exercise, swiss ball exercise and training using theraband reflected equal effectiveness in decreasing abdominal fat.

g. Brandon Schmitt, Tim Tyler, Malachy McHugh. "Hamstring Injury Rehabilitation and Prevention of Reinjury by using Lengthened

State Eccentric Training called - A New Concept" In this article participation in sport by individuals requiring sprinting and explosive movements are more prone to hamstring injury because of both occurrence and recurrence rates.

METHODOLOGY

STUDY DESIGN:

It is a experimental study

STUDY SETTING

Vadodara district (gym)-power lifter.

STUDY POPULATION:

Power lifter from Vadodara district

STUDY DURATION

Total study Duration:

Intervention Duration:

INCLUSION CRITERIA:

1. Age group of 20 to 30 year

2. Male power lifter, lifting since last 2 year

3. Subject willing to participate in the study.

4. Subjects who are able to read and write English

5. Subjects able to understand commands.

EXCLUSION CRITERIA:

1. Presently having any kind of injury in lower limb and low back

2. Any musculoskeletal disorder, neurogenic disorders, cardiovascular, respiratory, haematological or endocrine disorders.

3. Subjects having a history of upper limb or lower limb pain or trauma that had required treatment or interrupted their normal daily activities.

4. Previously undergone any surgery (6 month)

5. Subject's having acute or chronic abnormal pain related to surgical or medical illness, smokers, alcoholics or those receiving psychiatric treatment.

6. Players who are indulge in any kind of exercise or fitness program during the study.

A. SAMPLING METHOD:

- Sample size : total number of players=40
- Selection of sample: Selective sampling who fits in inclusion criteria , Random sampling (computerized generated software) for assigning group

B. DATA COLLECTION PROCEDURESAND INTERVENTIONS AND ITS METHOD:

MATERIAL USED:

- Consent form
- Evaluation sheet
- Mat
- Medicine ball
- Pen, Paper, Pencil

PREDICTOR AND OUTCOME MEASURES:

Vertical jump test

Sphygmomanometer test

o PROCEDURE:

Players will be taken from Vadodara district (gym). The age of the players will be ranged between 20-30 years. Players fulfilling the inclusion and exclusion criteria will be selected and assessed before starting the intervention. A written consent form about participation in the study and maintaining confidentiality will be taken from all players taking part in the study.

All players will be first subjected to a standard interview including details regarding the event. A clinical history and a complete Physical and Functional Physiotherapy Examination will be done in each player. If the player agrees to participate in the study, he will be given the Informed consent to sign it. Before starting the training program Pre-test will be done. The training period is of 3 sessions per week for 4 weeks.

At the completion of intervention outcome measures will be re-evaluated after completing the treatment for 4 weeks then pre and post scores will be compared. All Measures used are valid and shown to have acceptable reliability. Scores will be assessed by appropriate statistical methods.

PROTOCOL:

Subjects will divide into group by using randomized method (odd and even numbering) after all-inclusive criteria fulfilled.

Before starting exercises, introduction about all exercises will be given.

Group A: control group (n=20)

Group B: experimental group (n=20)

Group A: They will be doing regular Gym exercise (4 weeks)

Group B: medicine ball exercise (4 weeks)

Back to back pass

Abdominal crunch

Squat

Walking lung

Medicine ball lunges with rotation.

Exercise/Activity	Duration/repetitions
Back to back pass	3 days 10 repetition
Abdominal crunch	3 days 10 repetition
Squat	3 days 10 repetition

Walking lung	3 days 10 repetition
Medicine ball lung with rotation	3 days 10 repetition

D. ETHICAL CLEARANCE:

As the study includes human subjects, ethical clearance is obtained from ethical committee of institution and institution where the subject belongs. Also written consent will be taken from each subject who participates in study.

E. INFORMED CONSENT PROCESS:

A written consent form about participation in the study and maintaining confidentiality will be taken from all players taking part in the study.

F. CONFIDENTIALITY ISSUES AND DATA SAFETY:

A written consent form about participation in the study and maintaining confidentiality will be taken from all players taking part in the study.

Complete privacy of participants will also be maintained by Physiotherapist.

G. STATISTICAL METHODS TO BE USED AND DATA ANALYSIS:

All the participants will be assessed before and after intervention by using pair t-test.

PROCEDURE:

Core:

The subjects were instructed to do the following for core muscles:

1. Back to back pass

The subjects were provided guidance to do the following exercise along with their partner

They were told to stand with their back facing in opposite direction to each other and to hold the medicine ball at their waist level. Then they were directed to move their upper body at waist at left or right side and to pass the ball to their partner then to again move in opposite direction to receive the pass from their partner.

They completed a circle and one repetition.

NOTE:

Here the medicine ball is used to activate the abdominal muscles.

To make the exercise effective the hips should be pointed forward and the movement should occur only at waist.

2. Abdominal Crunch:

Patient position: Crook lying

They were instructed to grasp the medicine ball slightly away from their chest and were asked to come up by looking towards ceiling and then to gain the starting position.

NOTE:

For avoidance of injury the exercise should be performed within the comfortable range of motion.

Lower body:

The subjects were instructed to perform following exercise for lower body muscles:

1. Squat:

Starting position: Standing with feet shoulder width apart.

The subjects were directed to hold the medicine ball downwards with their elbows slightly bent. Then they were instructed to go down by bending at knees and the arms should be raised at the chest level and return to the starting position.

NOTE:

The following exercise should be performed by keeping the weight on heel and the knee should stay in the line of toes.

2. Walking Lunges:

Starting Position: Standing with both feet together

The subjects were instructed to gripthe medicine ball at the level of their waist. One foot should be kept forward while other in backward direction the forward knee should be flexed at 90 degree by lowering the body and by slightly bending the back knee. Then they were instructed to move the torso along with the medicine ball and then again coming back to the initial position.

RESULTS

Table 1: Baseline characteristic of subjects.

	N	MINIMUM	MAXIMUM	MEAN	SD
Group A	**20**	**21**	**30**	**25.55**	**2.350**
Group B	**20**	**20**	**30**	**26.55**	**2.981**

Table 1: Shows baseline characteristic of subject mean age of Group A .63 and Group B .97

Table 2: Age distribution

Age in years	GROUP A	GROUP B
20-22	3	2
23-25	5	3
26-28	10	9
28-30	2	6

Table 3:Comparison of pre and post data for Vertical jump test Group A

	Mean	± SD	t value	P value
Pre	1.4500	.39270	-8.431	.000
Post	2.0800	.36935		

Graph 1: Comparison of pre and post data for Vertical jump test Group A

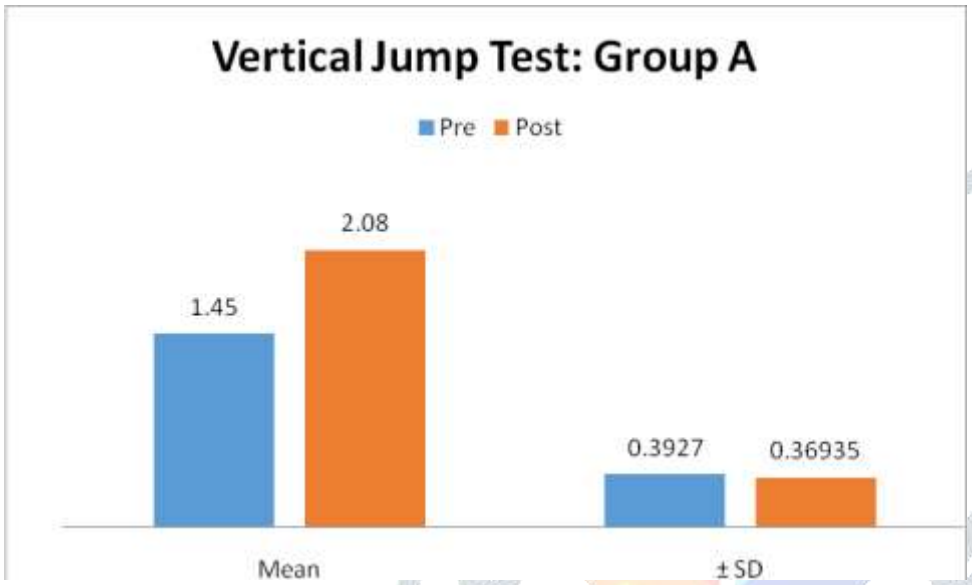


Table4 :Comparison of pre and post data for Vertical jump test Group B

	Mean	± SD	t value	P value
Pre	1.4050	.34713	-13.298	.000
Post	2.3750	.37819		

Graph 2: Comparison of pre and post data for Vertical jump test Group B

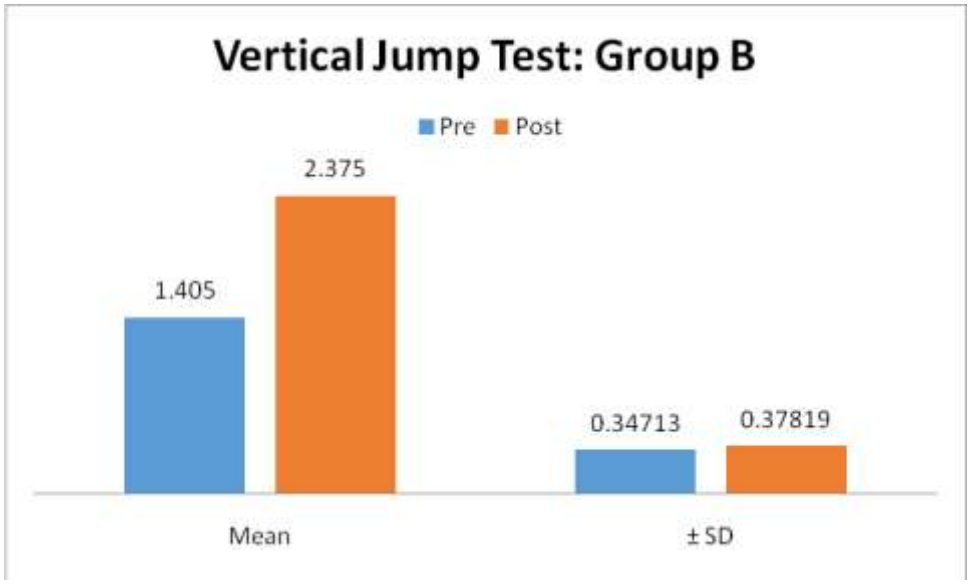


Table 5: Comparison of mean difference Vertical jump test for both Group

	Mean	± SD	t-value	p-value
Pre	0.63	0.33	-3.256	0.00
Post	0.97	0.32		

Graph 3: Comparison of mean difference Vertical jump test for both Group

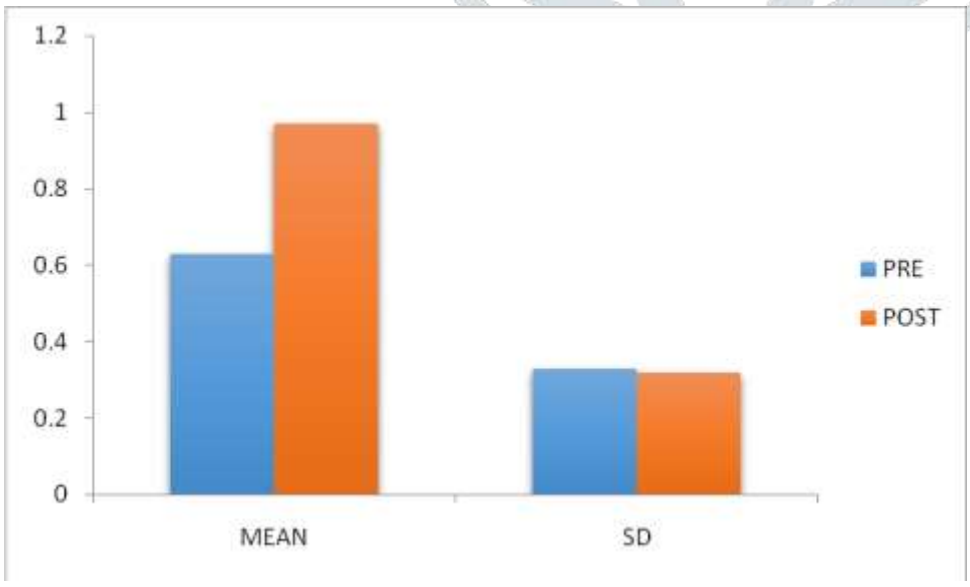


Table 6:Comparison of pre and post data of Hamstring strength in mm of hgGroup A

	Mean	± SD	t value	P value
Pre	93.5000	14.60894	-15.983	.000
Post	104.5000	13.16894		

Graph 4: Comparison of pre and post data ofHamstring strength in mm of hgGroup A

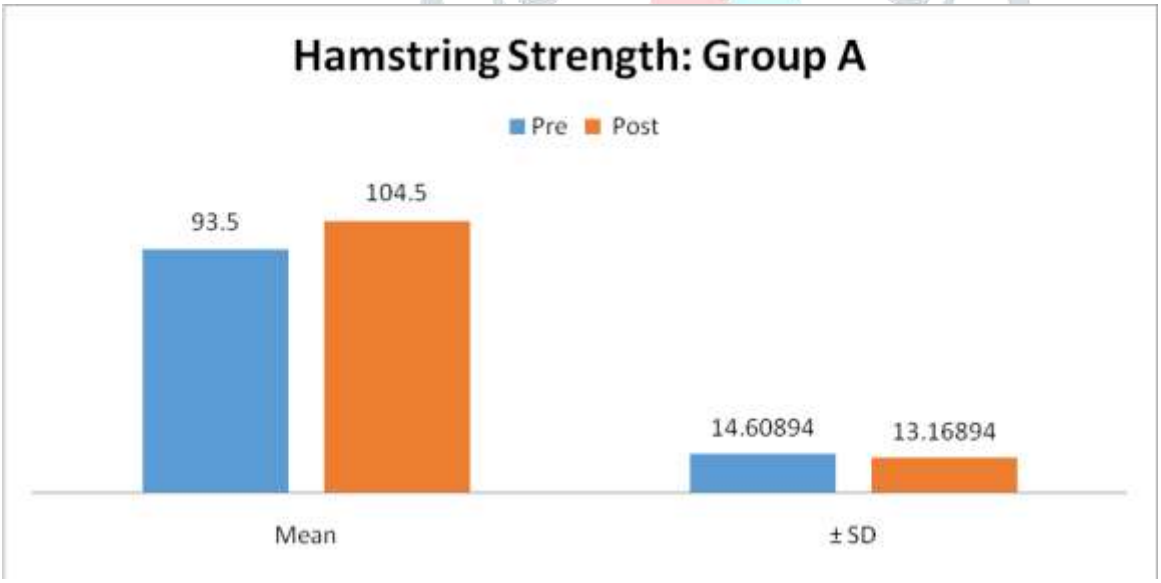


Table 7- Comparison of pre and post data of Hamstring strength in mm of hg Group B

	Mean	± SD	t value	p value
Pre	96.0000	21.12619	-11.768	.000
Post	120.2500	20.74120		

Graph 5: Comparison of pre and post data ofHamstring strength in mm of hgGroup B

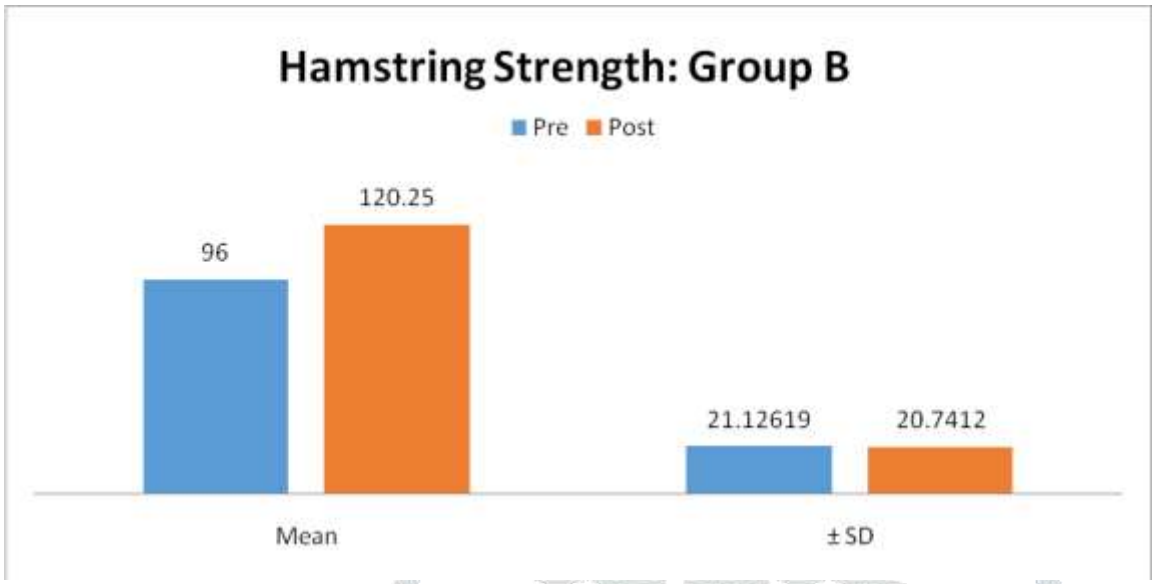


Table 8: Comparison of pre and post data of Hamstring strength in mm of hgfor both Group

	Mean	± SD	t value	p value
Pre	11.00	3.077	-6.099	0.00
Post	24.25	9.21		

Graph 6: Comparison of pre and post data ofHamstring strength in mm of hgfor both Group

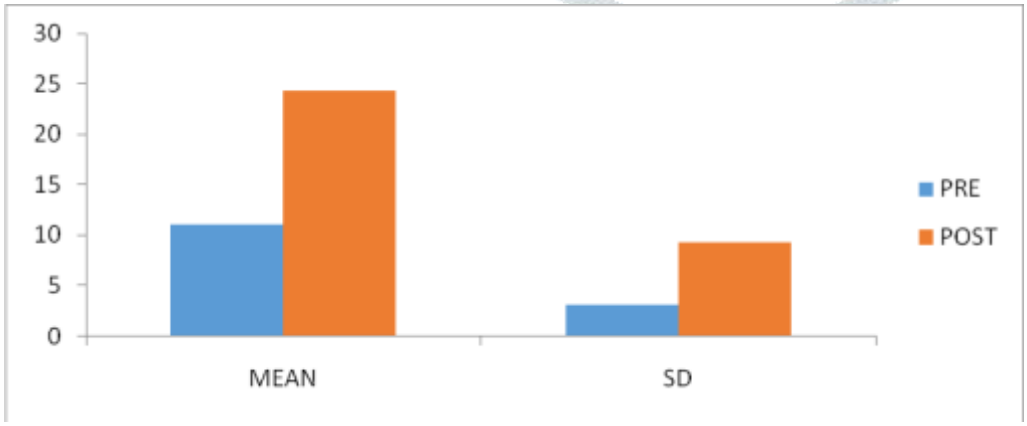


Table 9:Comparison of pre and post data of Gluteus strength in mm of hgGroup A

	Mean	± SD	t value	P value

Pre	91.5000	14.96487	-11.804	.000
Post	102.5000	14.55480		

Graph 7: Comparison of pre and post data of Gluteus strength in mm of hgGroup A

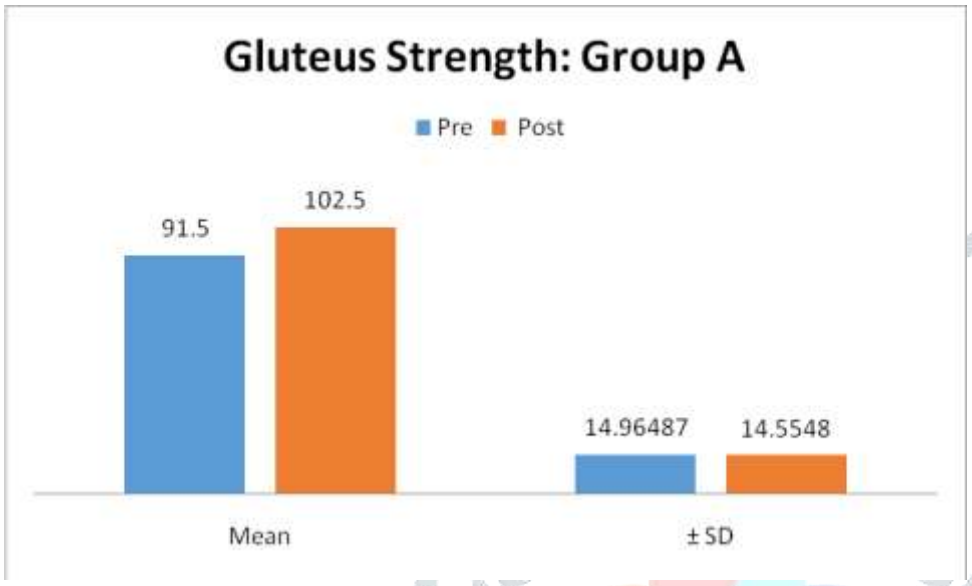


Table 10: Comparison of pre and post data of Gluteus strength in mm of hgGroup B

	Mean	± SD	t value	p value
Pre	93.5000	19.54078	-9.428	.000
Post	117.7500	14.82130		

Graph 8: Comparison of pre and post data of Gluteus strength in mm of hgGroup B

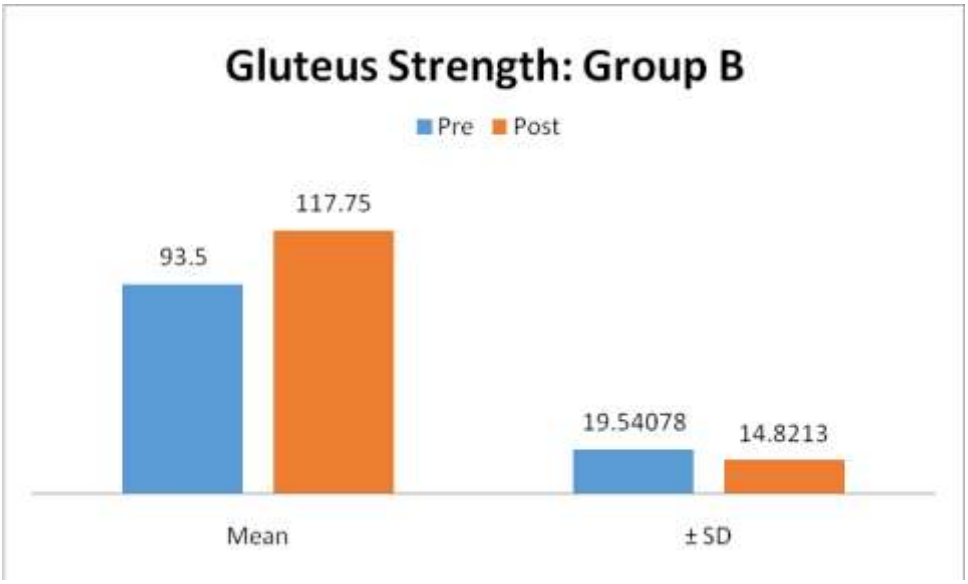


Table 11: Comparison of pre and post data of Gluteus strength in mm of hgfor both Group

	Mean	± SD	t value	p value
Pre	11.00	4.16	-4.84	0.00
Post	24.25	11.50		

Graph 9:Comparison of pre and post data of Gluteus strength in mm of hgfor both Group

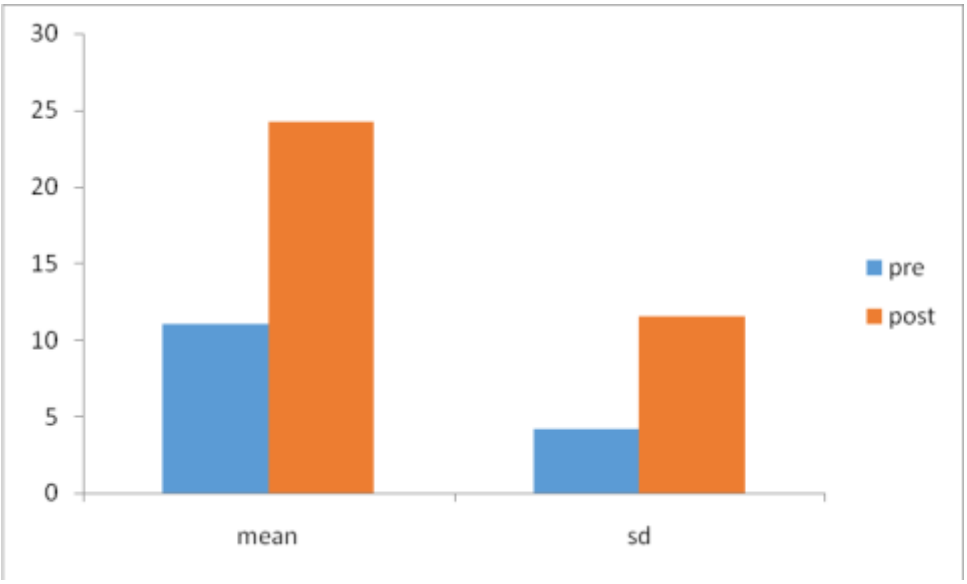


Table 12:Comparison of pre and post data of lower back strength in mm of hgGroup A

	Mean	± SD	t value	P value
Pre	223.5000	13.08877	-26.246	.000
Post	234.2500	12.80162		

Graph 10: Comparison of pre and post data of lower back strength in mm of hgGroup A

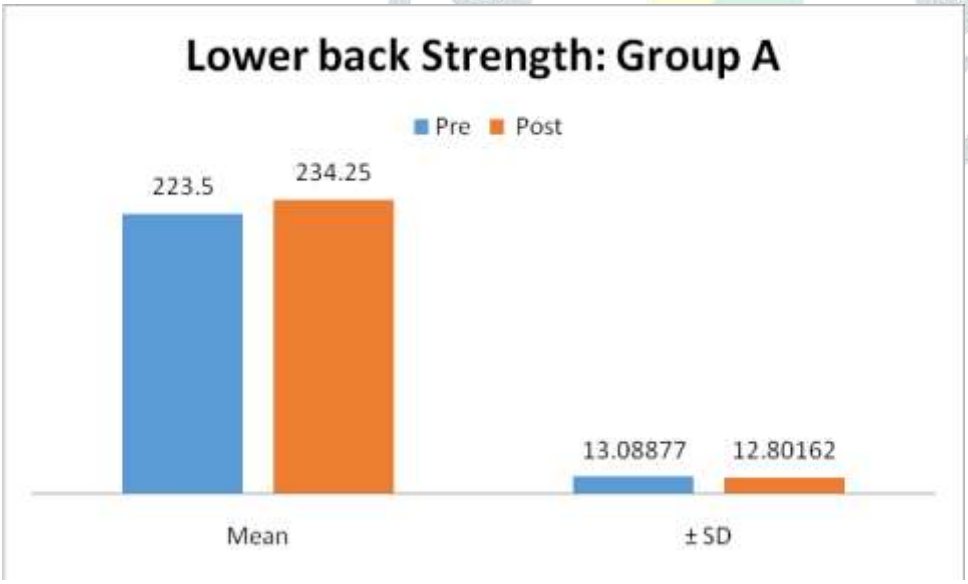


Table 13: Comparison of pre and post data of lower back strength in mm of hgGroup B

	Mean	± SD	t value	p value
Pre	208.7500	16.37352	-25.113	.000
Post	245.5000	14.13283		

Graph 12: Comparison of pre and post data of lower back strength in mm of hgGroup B

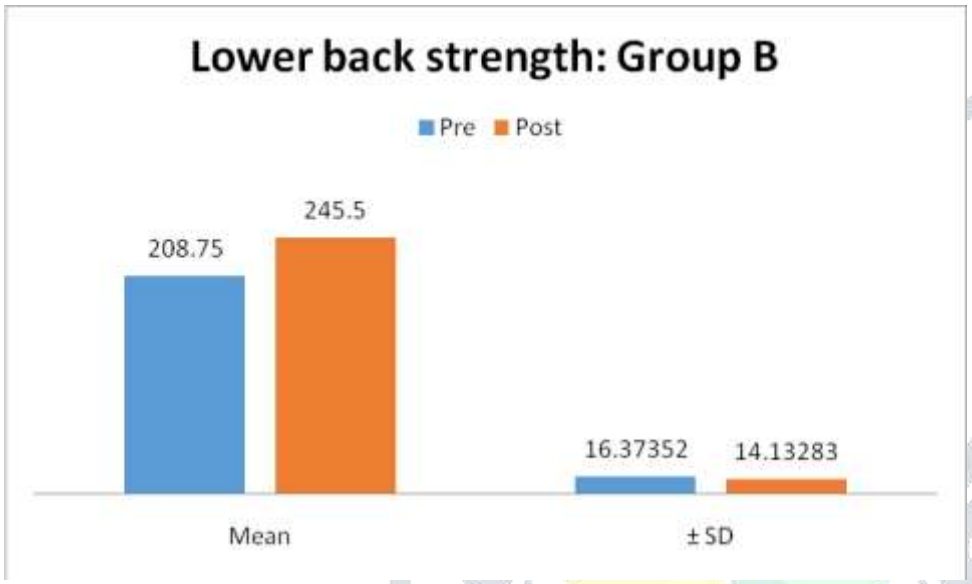
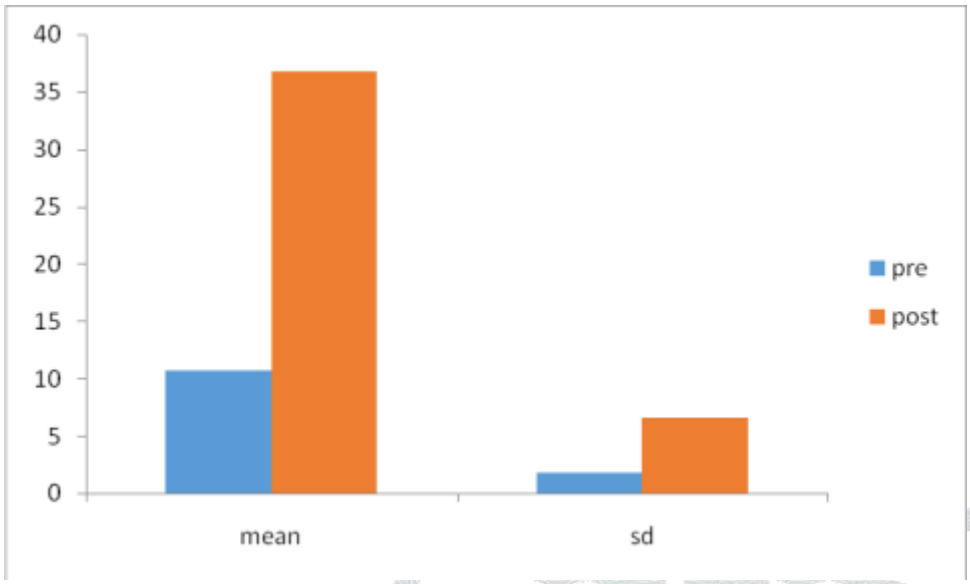


Table 14: Comparison of pre and post data of lower back strength in mm of hgfor both Group

	Mean	± SD	t value	p value
Pre	10.75	1.83	-17.11	0.00
Post	36.75	6.54		

Graph 13: Comparison of pre and post data of lower backstrengthin mm of hgfor both Group



DISSCUSION

This study was done to determine the effects of medicine ball on lower limb strength and core strength. The population included was college level power lifter.

In this study, the bilateral symmetry of the lower limb along with the strength of the hamstring and the core was assessed by 15 vertical jump test and sphygmomanometer test

Table 1 and 2 represents the age distribution among two groups consisting of 20 individual each of which the age ranged between 20 to 30 years. The maximum population among both groups belong to age group of 26 to 28 years.

Talking about the vertical jump test, Table 3, 4 and 5 represents the mean value of Group A that increased to 2.08 from 1.50 post treatment while when these values were observed in Group B pre-treatment value of 1.40 rose to 2.37. The overall mean was observed to be 0.63 in Group A while 0.97 in Group B with almost same SD as shown in Graph 1, 2 and 3. Thus, showing better improvement in individuals of latter group when performing Vertical jump test.

The Hamstring muscle strength was measured next using sphygmomanometer as shown in Table 6, 7 and 8. Graph 4 and 5 represents the pre and post treatment values of hamstring strength in group A and b respectively. The mean strength before treatment observed was 93.5 mm Hg and 96 mm Hg in Group A and B whereas after the specific treatment given to each group, the mean values hiked to 104.50 and 120.25 in groups A and B respectively. Hence, again training protocol using medicine ball resulted in better performance of individuals of group B. The mean and SD when compared among both group, individuals of Group A showed value of 11 which was upturned to 24.25 in group B with SD improved to 9.21 from 3.07.

Table 9, 10 and 11 depicts the mean values of Gluteus strength of Group A, Group B and its comparison among two of them. Graph 7, 8 and 9 also demonstrated the same values. The mean gluteus strength of group A was 91.5 which was improved to 102.5 post-treatment. Meanwhile, individuals in group B showed the mean strength of 93.5 mm Hg prior to treatment which grew by 117.75 after proper training. When the data among group B and A was compared the mean strength of gluteus muscles was found more improved in group B as compared to group A and SD observed was 4.16 and 11.10 in group A and B respectively.

Also, the lower back strength was measured and compared among both groups as shown in Table 12, 13 and 14. Graph 10 and 11

illustrates the lower back strength in group A and B respectively. Pre-treatment values in group A was 223.5 mm Hg and group B was 208.75 mm Hg which become 235.20 mm Hg in group A and 245.50 in group B after completing the treatment session. The data when compared the mean difference found was 10.75 in group A while it was 36.7 in group B with SD of 1.83 and 6.54 in group A and B respectively.

From results we found a positive effect of medicine ball on lower limb strength and core strength among college level power lifter.

There are two basic styles for dead lift which are used by the power lifter.

1. Conventional style.

2. Sumo style.

Every power lifter uses different styles depending upon their anthropometrics. The lifters using the conventional style dead lift utilize following biomechanics of the body that is excessive trunk lean and do anticipatory knee extension at the beginning of the lift.

There are total three phases of dead lift in which above movement occurs that is knee extension, hip extension and knee/hip extension. As the lifting load increases the ability to maintain the lumbar lordosis also reduces.

In sumo style dead lift there is different body mechanics that is being utilized they use wide stance and the upper body mass is placed in the center close to the barbell which reduces the external flexor moment at knee, hip, and L5/S1 joints.

Also, here knee extension is not the anticipatory movement at the starting position due to which quadriceps are placed in the optimal position for producing a greater force along with the wide stance. Also, knee and hip extensors contract at the same intensity and in the synergistic manner to reduce the external flexion moment which is increased by lifter. There is larger mediolateral (shear) ground force component compared to the conventional style.

Here lumbar lordosis is easier to maintain compared to the conventional style. Other researches indicates that less amount of tensile stress is placed on the posterior ligament

The muscles which are used in the dead lift are gastronomies and soleus which undergoes a concentric contraction in order to do plantar flexion of the ankle as the bar continues to increase quadriceps concentrically extends the knee.

At hip gluteus maximums and hamstrings begins to contract as the extension of the knee completes. In trunk the muscles like oblique and rectus abdominals contract in order to maintain the stability of the spine. Scapula stabilizers contract isometrically to prevent the flexion of the upper back.

Performing dead lifts increases the strength of the grip and the lower back and in previous researches shows that squats and the dead lifts are amazing postural exercise.

CONCLUSION

From the above study, it is concluded that using medicine ball exercises has great significance in improving lower limb strength and core strength in studied population. The most effective exercise observed was medicine ball single deadlift. It not only helped improved the dynamic stability of knee joint which is considered as the main element in working mechanism of lower limb but also had appreciating effects over maintaining and enhancing the strength of core muscles. However, subjects who underwent normal gym exercise showed less improvement and slower response when compared with subjects of experimental group. Thus, involving the medicine ball exercises in gym training for power-lifters is considered to be effective in developing the lower limb as well as core

strength and to prepare them physically to participate and overcome the challenges at the time of competition.

SUMMARY

This study was done to see the effect of strength training for core muscles and lower limb muscles in power lifter. A total 40 subjects were selected age between 20-30 years include males. Based on inclusion and exclusion criteria, subjects were randomly bifurcated into two groups, namely Group- A and Group- B, each consisting of 20 subjects. Group A received will be doing regular Gym exercise and Group B received only medicine ball exercise for a pried of 3 days per week for 4 weeks.

Vertical jump test was measured using the bilateral strength symmetry of the lower limb. Measurement were taken prior to and after intervention. Unpaired t-test was utilized for statistical analysis.

The results revealed that will be doing regular Gym exercise had significant effect on performance among power lifter. Thus, it can be conclude that medicine ball exercise training when incorporated with experimental can give better result in improving muscles strength of power lifter.

LIMITATIONS

- Sample size was small.
- Further follow up was not taken.
- Results are specific for male not generalize.

FURTHER RECOMMENDATION

- Further studies can be done on larger sample.
- Duration of the study should be elongated for better effect of training.
- Further study can be done to determine the clinical application of these exercise regimes for different age group with different sports.
- Similar study may be taken to physical education teacher and coaches to improve the other skills.

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