A STUDY TO COMPARE THE EFFECT OF PLYOMETRICS AND PILATES TRAINING ON DYNAMIC BALANCE AND CORE STRENGTH IN FOOTBALL PLAYERS

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Abstract: Background: Football is an intermittent, highly intense and complex sports, and vigorous activity changes in every 4-6 seconds so the players need a good dynamic balance and core strength, to pass to the next movement, to prevent injuries that may occurs. The success of the football player depends on the balance and core strength. Improvement in these physical variables depends upon the type of exercise training used by the athletes. There is limited study that supports the comparative effect of Pilates and Plyometric Training (PT) program in training of football players. To achieve success in the sport, best training method should be chosen by athletes or coaches.

Methods: 30 individuals were selected based on the inclusion and exclusion criteria, then divided into two groups. Group A received plyometric training and Group B received Pilates training. As a conventional treatment both groups received strengthening. The total duration was 60 minutes, 3days per week, for 2 months.

Result : Statistical analysis was done. Independent sample "t" test was used to compare age, plank test, MC Gill protocol and Dynamic leap and balance test between the groups. The Paired "t" test was used for the pre to post-test as well as within group comparison of plank test, MC Gill protocol and Dynamic leap and balance test. Results obtained revealed that when pre and post-test values of plank test, MC Gill protocol and Dynamic leap and balance test were compared the plyometric training group showed more significant effect than the Pilates training group.

Conclusion: This study concluded that both plyometric training and Pilates training are significantly improving the dynamic balance and core strength, but comparatively plyometric training showed significantly more improvement.

Keywords: Pilates, plyometrics, plank test, MC Gill protocol, Dynamic leap and balance test.

INTRODUCTION

In the present world, the sports experts seek scientific findings to prepare more professional athletes for successful performance in sports competitions.[1] Football is an intermittent, highly intense and complex sport, a match is played by two teams, each with a maximum of 11 players one must be the goal keeper and ten outfield players and during a ninety-minute match, there are vigorous activity changes in every 4-6 seconds with a number up to 1400 such as jumping, passing, kicking, turning and sprint and change of direction. During and after all these movements, the players need to stay in balance to pass to the next movement, to prevent injuries that may occur and to the quality of the next move. In football, in addition to the physical fitness such as swiftness, co-ordination,stability, flexibility and strength is required for high performance.[2]
In football, Plyometrics and Pilates training improve posture, balance, increase core strength and are helpful for improving athletically performance and sports-specificskills.[1]
The practical definition of plyometrics is a quick powerful movement involving a pre-stretching; counter movement that activates the stretch-shortening cycle.[3] Plyometricsis also called stretch-shortening drills. A program of high-intensity, high-velocity exercise. It increases muscle strength, power, proprioception, and explosiveness. Plyometrics is widely known as a potential tool for improving balance and functional sports performance[1]

Pilates is a popular form of exercise training that consists of a series of stretching and strengthening exercises with proper trunk control and breathing. It is method of conditioning that trains both body and mind. This training is based on the key principles of management of center of gravity, concentration, control, flow, and breathing. It improves

flexibility and strength, develops control and endurance in the entire body.[8]
A strong and solid core is required for carrying out dynamic functions.[2] Different researchers examined that core strength training helps with core muscles for better performance, endurance and strength of abdominal muscles and reduces back injuries in football trainees.[10] Core can be described as a muscular box with abdominals in the front, Para spinals and gluteals in the back, the diaphragm as the roof, and the pelvic floor as the
Bottom. Within this box are 29 pairs of muscles that help to stabilize the spine, pelvis during functional movements.

Balance is the most important component in athletic ability because balance is involved in nearly every movement that is performed in daily life. Dynamic balance is defined as the ability of an individual to maintain the stability of the center of mass during movements and is an essential component of many sports activities.9 The Dynamic Leap and Balance Test (DLBT) is used as a outcome measure because which mimics the movement patterns commonly involved in activities for e.g. walking, running, cutting etc. performed in daily life and sports requires the controlled movement of body segments over a base of support that is serially changing with alternating limb weight bearing.

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MATERIALS AND METHODOLOGY

MATERIALS USED:

- Pen
- Pencil
- Mat
- Couch
- Cones
- Stopwatch
- Measuring tape

METHODS INCLUDING

Method of data collection: observational method

SAMPLING PROCEDURE: Purposive sampling.

STUDY PROCEDURE

30 subjects were screened based on inclusion and exclusion criteria. Written consent was taken from them and they were divided into two groups, group A and group B.McGill, plank test, dynamic leap and balance test was taken as pre and posttest .GroupA was given Plyometrics and strengthening. Group B was given Pilates and strengthening, to improve dynamic balance and core strength in football players. The training program duration was 2 months, frequency was 3 days per week, and time was 60 min.

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What was the inclusion & exclusion criteria.

RESULT

The Paired "t" test was used for the Pre to posttest comparison of plank test, MC Gill protocol and Dynamic leap and balance test irrespective of groups. There was an improvement ($p < 0.05$) in plank test, MC Gill protocol as well as Dynamic leap and balance test from pretest to posttest irrespective of groups.

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The findings should be in Past tense.

When comparing Plank test on pre-test mean value of group A is 54.1±12.1 and post- test mean value of group A is 66.1±15.7 which is statistically significant p value
<0.001 and pre-test mean value of group B is 62.7±24.8 and post-test mean value of group B is 73.6±28.2 which is statistically significant p value <0.001.

When comparing MC Gill protocol in trunk flexion pre-test mean value of group A is

139.8±13.3 and post-test mean value of group A is 149.5±12.7 which is statistically significant p value <0.001 and pre-test mean value of group B is131.2±6.1 and post- test mean value of group B is 144.3±8.9 which is statistically significant p value
<0.001.

In trunk extension pre-test mean value of group A is 157.3±6.6 and post-test mean value of group A is 169.0±6.3 which is statistically significant p value <0.001 and pre-test mean value of group B is154.0±9.6 and post-test mean value of group B is
164.6±8.9 which is statistically significant p value <0.001.

In right side pre-test mean value of group A is 92.5± 14.4 and post-test mean value of group A is 111.1±6.3 which is statistically significant p value <0.001 and pre-test mean value of group B is 90.2±10.7 and post-test mean value of group B is
111.1±12.4 which is statistically significant p value <0.001.

In left side pre-test mean value of group A is 94.6± 13.6 and post-test mean value of group A is 117.6±13.6 which is statistically significant p value <0.001 and pre-test mean value of group B is 94.3±9.0 and post-test mean value of group B is 116.0±8.4 which is statistically significant p value <0.001.

When comparing Dynamic Leap and Balance Test in anterior pre-test mean value of group A is 52.1±7.3 and post-test mean value of group A is 56.7±7.4 which is statistically significant p value <0.001 and pre-test mean value of group B is 51.0±3.8 and post-test mean value of group B is 53.8±4.2 which is statistically significant p value <0.001.

In anteromedial pre-test mean value of group A is 62.2±6.5 and post-test mean value of group A is 64.7±6.8 which is statistically significant p value <0.001 and pre-test mean value of group B is 59.6±7.4 and post-test mean value of group B is 64.0±7.9 which is statistically significant p value <0.001.

In medial pre-test mean value of group A is 46.3±5.3 and post-test mean value of group A is 49.8±4.7 which is statistically significant p value <0.001 and pre-test mean value of group B is 43.8±4.7 and post-test mean value of group B is 48.5±5.2 which is statistically significant p value <0.001.

In poster medial pre-test mean value of group A is 78.0±5.2 and post-test mean value of group A is 81.0±5.1 which is statistically significant p value <0.001 and pre-test mean value of group B is 75.9±6.4 and post-test mean value of group B is 78.4±6.4 which is statistically significant p value <0.001.

In posterior pre-test mean value of group A is 77.4±7.4 and post-test mean value of group A is 79.6±7.6 which is statistically significant p value <0.001 and pre-test mean value of group B is 61.6±11.0 and post-test mean value of group B is 64.6±11.0 which is statistically significant p value <0.001.

Hence, there was a significant improvement ($p < 0.05$) in plank test, MC Gill protocol as well as Dynamic leap and balance test within both the groups. We concluded that both the training is effective for recreational football players. Plyometric training in group A is more effective than the Pilates training in group B.

DISCUSSION

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The study aimed to find out the effectiveness of plyometric training and Pilates training on dynamic balance and core strength of recreational football players. The players had similar baseline values for age. The result of the present study showed that there was a significant improvement in both the groups in terms of dynamic balance and core strength. Statistically group A i.e., plyometrics was found superior compared to Pilates.

In football players, balance and the core strength are the key elements. Dynamic balance is considered as the ability to maintain a stable position while performing a task. On fields, athletes are always exposed to situations where the body balance is dynamically challenged while performing movements such as walking, running, stepping and jumping.

Plyometrics consists of stretch-shortening cycle and is widely used as a training method in football to improve the efficiency of the player. A muscle that is stretched before a concentric contraction will contract more forcefully and more rapidly. Two models have been proposed to explain the phenomenon. The first is the mechanical model and neurophysical model. Mechanical model- In this model, elastic energy is created in the muscle and tendons and stored as a result of a rapid stretch. This stored energy is then released when the stretch is followed immediately by a concentric muscle action. The second model is neurophysical model- when a quick stretch is detected in the muscle, an involuntary protective response occurs to prevent overstretching and injury. This response is known as stretch reflex. The stretch reflex increases the activity in the muscle undergoing the stretch or eccentric muscle action,

Allowing it to act much more forcefully. The result is a powerful braking effect and the potential for a powerful concentric muscle action. Both the mechanical model (series elastic component) and the neurophysical model (stretch reflex) increase the rate of force production during plyometrics exercises. The stretch-shortening cycle- all plyometric

movement involve three phases. The first phase is the pre-stretch or eccentric muscle action. Here, elastic energy is generated and stored. The second phase is the time between the end of the pre-stretch and the start of the concentric muscle action. This brief transition period from stretching to contracting is known as the amortization phase. The shorter this phase is, the more powerful the subsequent muscle contraction will be. The third and final phase is the actual muscle contraction. In practice, this is the movement the athlete desires- the powerful jump or throw39.

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Pilates is famously known for its emphasis on the core- the center of the body from which all movement stems. It focuses on improving strength, core stability, flexibility, muscle control, posture and breathing. Pilates aims to improve coordination and control of the optimal lumbar pelvic stabilization needed for daily activities and function.

The main purpose of the study was to compare the effectiveness of plyometric training and Pilates training for improving the dynamic balance and core strength among football players. The result obtained through the study reveals that plyometric training and Pilates training both had made improvement in dynamic balance and core strength. But comparatively plyometric training can significantly affect more than Pilates training.

In this study 30 subjects were selected based on some inclusion and exclusion criteria, then randomly equally divided into two groups as group A and group B. after obtaining the consent, the procedure was completely explained to the participants. Outcome tools were used the most reliable measurement- Plank test, MC Gill protocol, and Dynamic leap and balance test. Then the plyometric training was applied to group A with exercise like ankle hops, standing jump and reach, cone hopes, lateral jump over barrier, single leg bounding, diagonal cone, standing long Jump. Then the Pilates training was applied to group B with exercise like hundreds, one leg stretch, double leg stretch, clams, shoulder bridge, hip twist, scissors, one leg kick, sidekicks, one leg circle also given .Strengthening exercise as common exercise for both groups. The result obtained through this study reveals that plyometric training and Pilates training were significantly increased in both groups, but comparatively group A that plyometric training group had significant improvement.

This study provides a overview of the effect of core and balance training with the help of plyometrics training and Pilates training among recreational football players. Its main findings showed that plyometrics training and Pilates training could improve the core strength and balance in recreational football players.

CONCLUSION

This study concludes that both plyometric training and Pilates training can significantly improve on dynamic balance and core strength in football players however, plyometric training is more effective than the Pilates training in improving dynamic balance and core strength.

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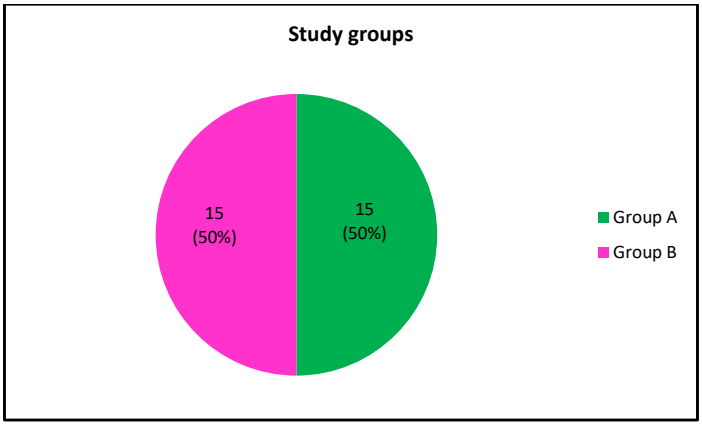
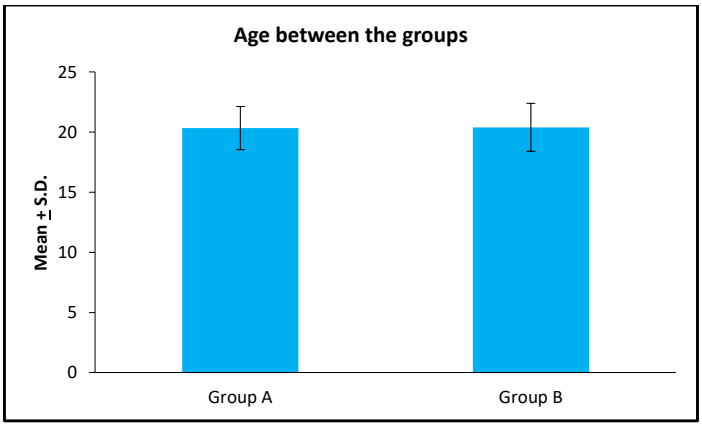
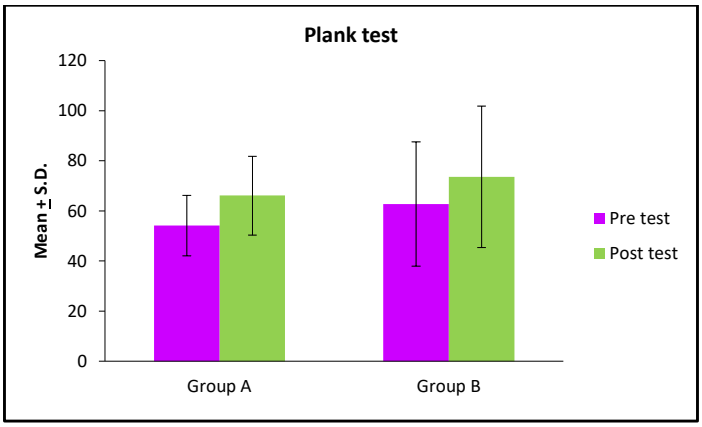
Conflict of interest : Nil

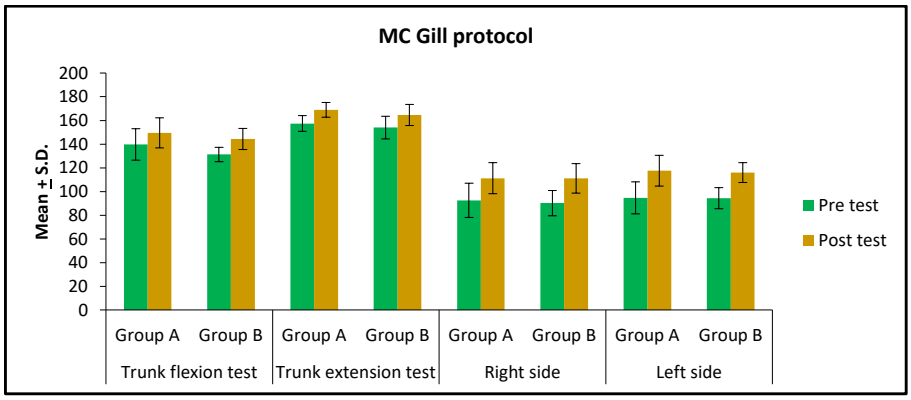
Ethical clearance: by institutional ethical committee

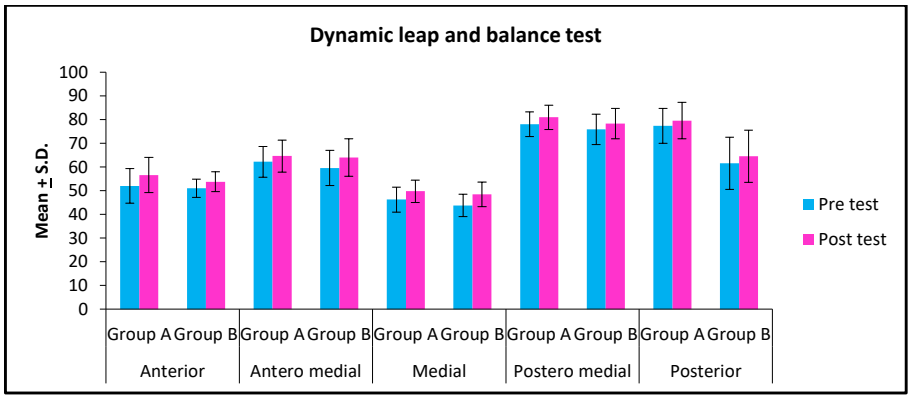
Figures :




Age between the groups
Mean ± S.D.
25
20
15
10
5
0
Group A
Group B


Plank test
Mean ± S.D.
120
100
80
60
40
20
0
Group A
Group B
Pre test
Post test


MC Gill protocol
Mean ± S.D.
200
180
160
140
120
100
80
60
40
20
0
Group A
Group B
Trunk flexion test
Trunk extension test
Right side
Left side
Pre test
Post test



Tables

COMPARISON OF MC GILL PROTOCOL BETWEEN GROUPS

		Pre test				Post test			
		Mean	S.D.	"t"	p value	Mean	S.D.	"t"	p value
Trunk flexion test	Group A	139.8	13.3	2.27	0.031	149.5	12.7	1.28	0.211
	Group B	131.2	6.1			144.3	8.9		
Trunk extension test	Group A	157.3	6.6	1.13	0.270	169.0	6.3	1.55	0.132
	Group B	154.0	9.6			164.6	8.9		
Right side	Group A	92.5	14.4	0.50	0.624	111.1	13.1	0.02	0.986
	Group B	90.2	10.7			111.1	12.4		
Left side	Group A	94.6	13.6	0.05	0.960	117.6	13.1	0.39	0.697
	Group B	94.3	9.0			116.0	8.4		

("t" = Independent sample "t" test; * Significant)

COMPARISON OF DYNAMIC LEAP AND BALANCE TEST BETWEEN GROUPS

		Pre-test				Post-test			
		Mean	S.D.	"t"	p value	Mean	S.D.	"t"	p value
Anterior	Group A	52.1	7.3	0.48	0.633	56.7	7.4	1.29	0.206
	Group B	51.0	3.8			53.8	4.2		
Antero medial	Group A	62.2	6.5	1.02	0.316	64.7	6.8	0.26	0.795
	Group B	59.6	7.4			64.0	7.9		
Medial	Group A	46.3	5.3	1.37	0.181	49.8	4.7	0.71	0.485
	Group B	43.8	4.7			48.5	5.2		
Postero	Group A	78.0	5.2			81.0	5.1		

medial	Group B	75.9	6.4	1.02	0.316	78.4	6.4	1.24	0.227
Posterior	Group A	77.4	7.4	4.62	< 0.001*	79.6	7.6	4.35	< 0.001*
	Group B	61.6	11.0			64.6	11.0		

("t" = Independent sample "t" test; * Significant)

COMPARISON OF EFFECTIVENESS (PRE – POST) PLANK TEST, BETWEEN GROUPS

Effectiveness (Pre – post)		Mean	S.D.	"t"	p value
Plank test	Group A	-12.00	8.22	-0.42	0.677
	Group B	-10.87	6.44		

("t" = Independent sample "t" test; * Significant)

COMPARISON OF EFFECTIVENESS (PRE – POST) MC GILL PROTOCOL BETWEEN GROUPS

Effectiveness (Pre – post)		Mean	S.D.	"t"	p value
Plank test	Group A	-12.00	8.22	-0.42	0.677
	Group B	-10.87	6.44		
Trunk flexion test	Group A	-9.67	3.97	1.95	0.061
	Group B	-13.09	5.50		
Trunk extension test	Group A	-11.66	2.17	-1.29	0.209
	Group B	-10.67	2.05		
Right side	Group A	-18.62	4.98	1.20	0.242
	Group B	-20.84	5.18		
Left side	Group A	-23.03	3.60	-0.94	0.355
	Group B	-21.66	4.33		

("t" = Independent sample "t" test; * Significant)

COMPARISON OF EFFECTIVENESS (PRE – POST) DYNAMIC LEAP AND BALANCE TEST BETWEEN GROUPS

Effectiveness (Pre – post)		Mean	S.D.	"t"	p value
Anterior	Group A	-4.61	0.90	-4.37	< 0.001*
	Group B	-2.80	1.33		
Antero medial	Group A	-2.48	0.97	5.69	< 0.001*
	Group B	-4.38	0.86		
Medial	Group A	-3.52	2.26	1.32	0.196
	Group B	-4.73	2.74		
Postero medial	Group A	-2.95	0.91	-1.49	0.147
	Group B	-2.52	0.65		
Posterior	Group A	-2.20	0.77	2.70	0.012*
	Group B	-3.01	0.87		

("t" = Independent sample "t" test; * Significant)

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