Effect of Core Strengthening and Conditioning Programme on Badminton Beginners

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Abstract

Background : Badminton requires a specific physical conditioning in terms of motor and action controls; coordinative variables such as reaction time, foot stepping and static or dynamic balances, which are essential motor demands in this sport. Therefore, badminton players need enough core strength and a high level of dynamic balance during the rapid postural movements around the court.

Objectives : To study the effect of core strengthening and to study the effect of conditioning program on badminton beginners

Methodology : 25 players, aged between 12-19 years were given core strengthening and conditioning protocol for 4 weeks. Players were assessed at 0, 2nd and 4th week through 60 degree curl up test and modified Sorensen test.

Results : statistically significant difference was seen in pre and post treatment values of the 2 tests. In 60 degree curl up test at 0 week p=, 2nd week p= and 4th week p= and in modified Sorensen test at 0 week p=, 2nd week p= and 4th week p=

Conclusion : players showed improvement in their core strength after 4 weeks of core training.

Key words : *badminton, core, conditioning, players, strength*

Introduction

Badminton is a racquet sport played using racquets to hit a shuttlecock across a net. There is high level skill required to play badminton at the elite level, though to be a successful player they also need good reflexes and be quick and agile around the court. The important factors for badminton players are muscle strength, muscular endurance, power, speed, agility, flexibility, balance and coordination. Functional movements are highly dependent on this part of the body, and lack of core muscular development can result in predisposition of injury[1].

Core muscles includes transverse abdominal muscle, abdominal external oblique muscle, multifidus muscles, abdominal internal oblique, psoas major muscle. A core muscle is used to stabilize the thorax and the pelvis during dynamic movement and it also provides internal pressure to expel substances. Static core functionally is the ability of one's core to align the skeleton to resist a force that does not change. The core strength training plays an important role in reducing and preventing lower and knee joint injuries[2] .

It appears that repeated activation of core musculature along with extremity movements helps to improve postural control. During performance of sports skills, a stable core provides a foundation upon which the muscles of the upper and lower extremities can

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accelerate body segments and transfer force between distal and proximal body segments[3] .

Core stability is defined in athletic settings as the optimum production, which can transfer and control the force from the centre of the body to the limbs, through stabilization of the position and motion of torso[4]. Also described it as a central motor control of the lumbar-pelvic-thigh to maintain the stability of the core region against different postural and external forces.[5]

Generally referred to as the core area, these overall and local muscles which constantly working to maintain posture and assist in changing postures and dynamic movements[10]. Described the role of core muscles as to, transfer force and doing a link between upper and lower extremities, help passive existence protect and support the spine. Previously, core stability exercises were widely used for reducing the injuries of the low back and lower extremities[5,6,7]. Recently, core stability training has been purported to improve player performance[7-11], but the previous studies have not supported these claims in badminton sport.

The core muscle strengthening may help to improve dynamic balance and muscle coordination between lower and upper extremities, as well as reducing injury risk and muscle imbalance. Thus, the purpose of this study to find out the effect of core strengthening and conditioning programme on badminton beginners.

Methodology

An approval for the study was obtained from the Protocol committee and the Institutional Ethical Committee of KIMSDU. An Experimental study was conducted for a duration of 6 months at Physiotherapy department of Krishna college of Physiotherapy. Individuals were approached and those fulfilling the inclusive criteria were selected.

Study Design : Experimental study

Setting: Krishna Hospital, Physiotherapy Department

Study population : All participants were selected by Simple Random Sampling method. Participants were selected on the basis of inclusion and exclusion criteria.

Study size – 25 subjects

Procedure : In general, the subjects performed 3 sessions badminton training per week for ~90 - 120 minutes every session; the (CSG) group performed the core stability training only 2 sessions per week over a period of 4 weeks. The core stability training programme of (CSG) group consisted of three progressive levels of exercises which focusing on the strengthening training of muscle abdominal, low back, and pelvic muscles through a variety of functional positions and different exercises

Exercise protocol

The group will receive respective training for 4 weeks:

Weeks	Shoulder bridge	Full plank	Prone bridge	Abdominal crook	Side bridge	Supine bridge	Diagonal crunch	Pitcher squat	Back bridge
Week 1	25×2	20×2	20×2	15×2	20×2	25×2	15×2	20×2	20×2
Week 2	30×2	25×2	20×2	20×2	25×2	20×2	20×2	20×2	25×2
Week 3	30×2	25×2	30×2	25×2	30×2	30×2	25×2	30×2	25×2
Week 4	45×2	35×2	25×2	30×2	25×2	40×2	30×2	25×2	35×2

Outcome Measures:

60 degree curl up test was done with subjects positioned on the plinth against a wedge supporting the back so that the hip was flexed to 60 degrees. Knees flexed to 90 degrees as measured with goniometer in that stable arm is parallel to the ground and movable arm is at the supporting wedge. The test began when the wedge was removed and was terminated when the subject could no longer maintain the 60 degree angle independently. Subjects were asked to hold the position as much as possible. The duration on the stopwatch was noted for the individual subjects

Modified Sorensen test subjects lay prone on an examination table with the trunk of the body extended off the edge of the table at the level of the anterior superior iliac spine of the pelvis. The buttocksand legs are fixed to the table with two straps. Subject were instructed to cross their arms in front of there chest and to lift their upper body until their trunk was parallel to the ground. Subjects were asked to hold the position as much as possible. The duration on stopwatch was noted for individual subjects.

Results

1. **AGE DISTRIBUTION**

Table no – 1: Interpretation : 56% players were in the age group of 12-15 years 44% players were in the age group of 16-19 years

AGE GROUP	NUMBER OF SUBJECTS
12-15 YEARS	14
16-19 YEARS	11

2. **GENDER DISTRIBUTION**

Table no – 2: Interpretation : 52% of male participated in the study 48% of female participated in the study

GENDER	NUMBER OF SUBJECTS
MALES	13
FEMALES	12

3. COMPARISON OF PRE AND POST TREATMENT P AND T VALUE WITHIN GROUP

Table no – 3

VARIABLES	EXPERIMENTAL GROUP						INTERPRETATION
WEEKS	0 WEEKS		2 WEEKS		4 WEEKS		
	T value	P value	T value	P value	T value	P value	
60 DEGREE CURL UP TEST	<0.001	1.393	<0.001	2.241	0.002	3.418	Extremely significant
MODIFIED SORENSANS TEST	0.268	2.154	0.198	1.669	0.270	0.670	Extremely significant

Interpretation : The above table shows comparison of pre and post treatment of 60 degree curl up test and modified Sorenson test, with the p value of 1.393, 2.241 and 3.418 at 0 weeks , 2 weeks and 4 weeks respectively which is statistically extremely significant significant.

4. COMPARISON OF PRE AND POST TREATMENT MEAN AND STANDARD DEVIATION VALUE WITHIN GROUP

Table no - 4

VARIABLES	EXPERIMENTAL GROUP			INTERPRETATION
WEEKS	0 WEEK	2WEEK	4WEEK	
	MEAN±SD	MEAN±SD	MEAN±SD	
60 DEGREE CURL UP TEST	123.94±93.52	160.15±93.54	205.73±90.64	Extremely significant
MODIFIED SORENSEN TEST	71.73±23.51	93.73±25.03	122.89±25.76	Extremely significant

Interpretation : The above table shows comparison of variable of pre and post treatment of 60 degree curl up test and modified Sorenson test, which is statistically extremely significant

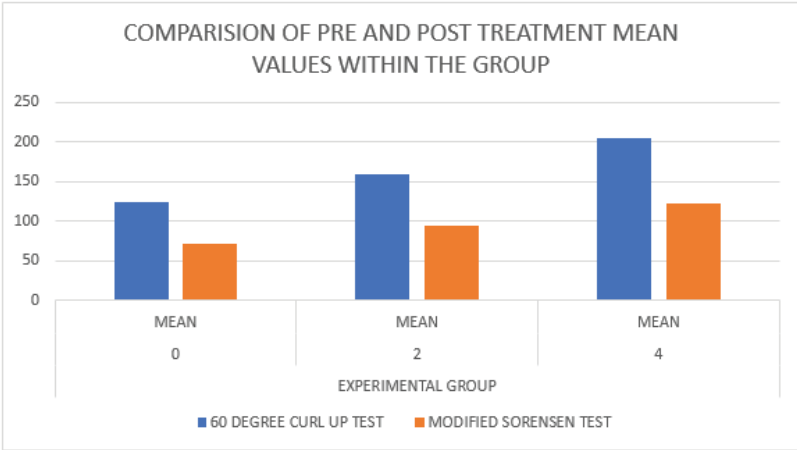

Chart no – 1: Comparison of pre and post treatment mean values within the group

Discussion

The present clinical trial was conducted to compare the effectiveness of core strengthening and conditioning program in badminton beginners. Results of this study were focused on improvement of core strength and endurance. It was noticed that there was improvement in all the above parameters in the experimental group

A combination of 60 degree curl up test and modified Sorensen test were used as outcome measures were used to assess the effectiveness of core strengthening and conditioning program in badminton beginners.

In this study, the age group of the participants was in between 12 to 19 years. Subjects between this age group were considered as beginners of badminton and training them before hand could raise their level of performance in the game much early. The players of this age group could take up more advance training and more hours of play.

Sample size of present study consisted of 12 females and 13 males that are 48% females and 52% males.

From table number 3 we can see that in 60 degree curl up test the group showed statistically significant differences in pre and post treatment with p value, in 0-2 weeks p=1.393, 2 – 4 weeks p=2.241 and 0-4 weeks p=3.418. Similarly, a study showed statistically significant difference in 60 degree curl up test after incorporating core strengthening exercises with the help of swiss ball exercise for 4 weeks was found to be significant

From table number 3 we can see that in modified Sorensen test the group showed statistically significant difference in pre and post treatment with p value within, 0-2 weeks p=2.154, 2-4 weeks p=1.669 and 0-4 weeks p=0.670.

The core muscles after four weeks of strengthening will respond like any other skeletal muscle, to training, thereby improving the ability of the neuromuscular system to perform dynamic, eccentric, isometric stabilization contractions in response to gravity and momentum. Higher core stability performance might lead to improved synchronization of motor units and lowering of neural inhibitory reflexes[12].

It is well known that position of the spine significantly determines the position of the body's COG and compensatory muscle synergy/strategy to counteract the perturbations, to maintain the body's equilibrium state and to regulate body's postural control. Higher core stability performances allow optimal and long sustained contraction of the deeper spinal stabilizer muscles. These stabilizer muscles due to their close proximity with the spine are responsible for better control of the intersegment motion of the spine and thus a better control of the body's COG. Study also indicated that core training not only improve the core muscle strength, but also improve the stability of the body movement during the LOS test which requires the well coordination of the upper and lower extremity limb, because a recent study also indicated that pilates training can enhances the control of trunk movement, and improves the neuromuscular coordination of movements[13].

An Article concludes that there is effect of core strengthening on dynamic balance and agility in badminton players[14].

The finding of this study showed significant improvement in the overall performance of 60 degree curl up test and modified Sorenson test.

Limitations:

1. Small sample size

2. Subjects could not be followed up after the study.

3. Duration of the study was short.

Recommendations:

1. Studies with longer duration are recommended with longer follow-up period to assess long term benefits.

2. Conduct the study with larger sample size.

3. This was a heterogenous group with both male and female population, future studies could be done taking up a homogenous sample with either male or female subjects separately.

Conclusion

This study concluded that there was an improvement in the core strength of the beginner badminton players after undergoing 4 weeks of core strengthening protocol. This indirectly improved their game by reducing injuries to lower limb and improving their dynamic balance.

Conflict of Interest: There were no conflicts of interest in this study.

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Ethical Clearance: The study was approved by the institutional ethics committee of KIMSDU.

References

[1.] Karaheanes, Steven J. Principle of manual sports medicines, 2004, 510-511.

[2] Leetun DT, Ireland ML, Willson JD, Ballantyne BT, DAVIS IM. Core stability measures as risk factors for lower extremity injury in athletes. Medicine & Science in Sports & Exercise. 2004 Jun 1;36(6):926-34.

[3.] Kibler WB, Press J, Sciascia A. The role of core stability in athletic function. Sports medicine. 2006 Mar 1;36(3):189-98.

[4.] Jin ZH, Kibler WB, Press J, Sciascia A. The Role of Core Stability in Athletic Function. J Beijing Sports Uni. 2008;12:039.

[5] Carpes FP, Reinehr FB, Mota CB. Effects of a program for trunk strength and stability on pain, low back and pelvis kinematics, and body balance: a pilot study. Journal of bodywork and movement therapies. 2008 Jan 1;12(1):22-30.

[6] Willardson JM. Core stability training: applications to sports conditioning programs. The Journal of Strength & Conditioning Research. 2007 Aug 1;21(3):979-85.

[7] Kimura Y, Tsuda E, Hiraga Y, Maeda S, Sasaki S, Sasaki E, Fujita Y, Ishibashi Y, Makino M. Trunk motion and muscular strength affect knee valgus moment during single-leg landing after overhead stroke in badminton. British journal of sports medicine. 2014 Apr 1;48(7):620-.

[8] Saeterbakken AH, Van den Tillaar R, Seiler S. Effect of core stability training on throwing velocity in female handball players. The Journal of Strength & Conditioning Research. 2011 Mar 1;25(3):712-8.

[9] Bressel E, Yonker JC, Kras J, Heath EM. Comparison of static and dynamic balance in female collegiate soccer, basketball, and gymnastics athletes. Journal of athletic training. 2007 Jan;42(1):42.

[10] Earp JE, Kraemer WJ. Medicine ball training implications for rotational power sports. Strength & Conditioning Journal. 2010 Aug 1;32(4):20-5.

[11] Ozmen T, Aydogmus M. Effect of core strength training on dynamic balance and agility in adolescent badminton players. Journal of bodywork and movement therapies. 2016 Jul 1;20(3):565-70

[12.] Cosio-Lima LM, Reynolds KL, Winter C, Paolone V, Jones MT. Effects of physioball and conventional floor exercises on early phase adaptations in back and abdominal core stability and balance in women. The Journal of Strength & Conditioning Research. 2003 Nov 1;17(4):721-5.

[13.] Lugo-Larcheveque N, Pescatello LS, Dugdale TW, Veltri DM, Roberts WO. Management of lower extremity malalignment during running with neuromuscular retraining of the proximal stabilizers. Current sports medicine reports. 2006 Jun 1;5(3):137-40.

[14.] Sighamoney R, Kad R, Yeole UL. Effect of core strengthening on dynamic balance and agility in badminton players. International Journal of Physical Education, Sports and Health. 2018;5(1):86-.