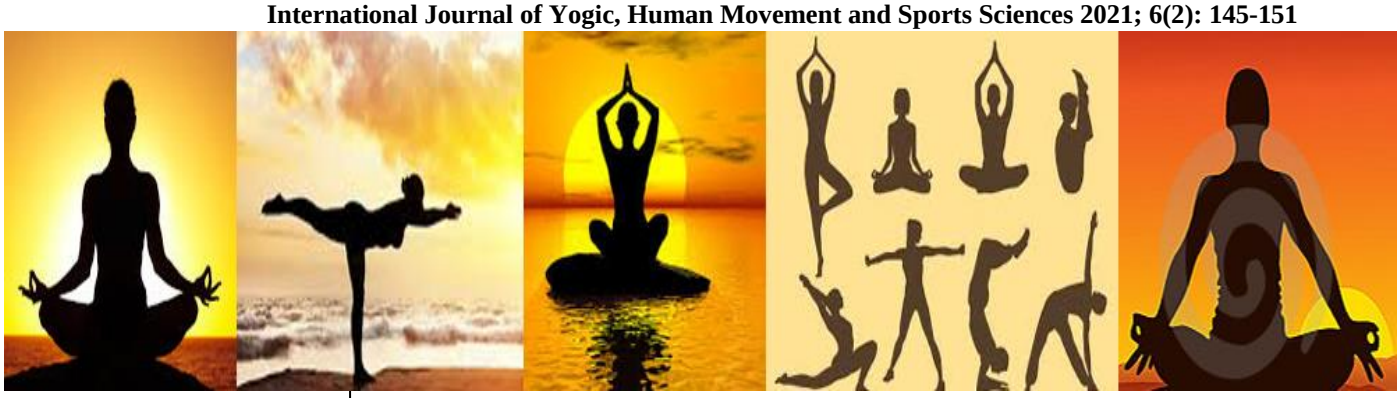
International Journal of Yogic, Human Movement and Sports Sciences 2021; 6(2): 145-151



ISSN: 2456-4419
Impact Factor: (RJIF): 5.18
Yoga 2021; 6(2): 145-151

www.theyogicjournal.com
Received: 19-07-2021
Accepted: 21-09-2021

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Effects of neuromuscular training on agility, balance and functional performance in young cricketers

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DOI: https://doi.org/10.22271/yogic.2021.v6.i2c.1237

Abstract
Introduction: For improving balance Agility, Functional performance, so many research has been done in past for cricketers. For this purpose, the effectiveness of 4 week of Neuromuscular training on functional movement screen and physiological performance in adolescent cricketers is done.
Objective: To compare the effectiveness of 4 week of Neuromuscular training with Conventional strength training on the physical fitness of adolescent cricketers.
Methods: 30 adolescent cricketers were divided into Neuromuscular training group (NMT, n=15) and Conventional strength training group (CST, n=15). For the verification of Neuromuscular training response – 1. Y test= For balance 2. T test= For agility 3. FMS test= For functional performance (Functional Movement Screen) was used. The NMT group (intervention group) received a weekly 4×45 min. training session with an emphasis on movement quality, whereas the CST group (control group) was involved in regular conventional training protocol. ANALYSIS: The statistical analysis was done using SPSS software version 22 .Descriptive analysis was carried out for Age, BMI, Gender, T-Test, Y-Test and FMS was done. Paired T-test, Y-Test, FMS was used to evaluate the difference within the group for all outcome measure. 9 Independent T-Test, Y-Test, FMS was used to evaluate the difference between the groups. RESULT: At the end of 4 weeks, when compare to NMT groups and CST group. The group undergone NMT showed significant increases in Agility, Balance and Functional performance in participant compared to those undergone CST training. The agility of the cricketers was measured using T-test and there was significant improvement in the pre and post values of T-test within the group as well as between the group i.e. (pre p=0.91 and post p=.113) The balance of the cricketers was measured using Y-Test and there was significant change in the pre and post value of Y -test within the group as well as between the group in Left lower limb. (pre [p]=.000 post[p]=.953) While, there was not much significant difference in pre and post value of Y-test of Right lower limb. i.e. (pre (p)=.000, post (p)=.961. The Functional performance of the cricketers were measured using FMS (Functional Movement Screen) and there was significant change in the pre and post value within the group as well as between the group. (pre [p]=.002 post [p] =.000 CONCLUSION: Both interventions are efficient to improve physical fitness of adolescent cricketers, however NMT includes better adoptive responses to CST.

Keywords: agility, neuromuscular training, functional movement screening

Introduction
Cricket is one of many games, in the “Club ball” sphere that basically involve hitting a ball with a hand-held implement It is played between two teams of 11 players on a field at the center of which is a 22 yard (20m) pitch with a wicket at each end. Cricket was first played in 16th century at South East England. The one who plays cricket professionally are referred as “Cricketers”.
Neuromuscular Training has been considered an elemental therapeutic strategy to enhance the neurophysiological entity of joints for coordinated functioning [3]. Neuromuscular training programs are hypothesized to improve joint position sense, enhance joint stability and develop protective joint reflexes, ultimately preventing lower limb injuries [1]. Neuromuscular Training is responsible for the dynamic joint stability which is defined as training enhancing unconscious motor response by stimulating both afferent signals and central mechanisms [3]. The Neuromuscular control provides reflexive activation of dynamic restraints by several

mechanism including co-activation of shoulder girdle muscles and its muscular stiffness, activation and reflex stabilization. It is the response from the efferent motor system which ensues sensory information in the form of complex or simple, volitional or reflex stimuli [3].

Agility is the athlete's ability to change direction quickly and appropriately while maintaining maximal speed, balance and power. It requires optimal core strength, balance or body control and flexibility [2]. T-test is a test for agility of forward, lateral and backward running.

Balance is an ability to maintain the Line of Gravity (LOG) of a body within the Base of Support (BOS) with minimal Postural Sway [10]. It requires Co-ordination of input from multiple Sensory systems including Vestibular Somatosensory and Visual System. Age ➢ Gender ➢ Height all have been shown to impact an individual's ability to balance. The Y Balance Test (YBT) is a reliable tool and may be used to predict injury risk. the YBT, was created to improve repeatability by standardizing the protocol and eliminating areas that reduced accuracy [7]

The Functional Movement Screen (FMS) is a screening tool used to evaluate seven fundamental movement patterns in individuals with no current pain complaint or musculoskeletal injury. The objectives of this study were to document the distribution of scores and to determine whether FMS scores could predict injury in a large military cohort. To determine interrater test-retest and interrater reliability of the Functional Movement Screen (FMS) among novice raters [8, 9]. Hence The Aim of the study is mainly focused on Performance and to find out the effectiveness of Neuromuscular Training on Agility, Balance, Functional Performance in Young Cricketers. Objectives of the study is To compare Neuromuscular Training Program and Conventional Strength Training Program. on Agility, Balance, and Functional Performance in Young Cricketers.

Methodology

Study design was Pre -post Experimental study.30 Young cricketers of age group 13-23 were taken for the study from the Shree Sai Cricket Club, Surat. Medical questionnaires, Informed consent form were obtained before the start of the study. Purposive sampling was done. The duration of treatment was 6 Weeks, which included 4 Weeks of NMT and 2 week of Familiarization at Shree Sai Cricket Club, Surat.

Inclusion criteria

- Healthy (with no systemic illness), cricketers matched for age are selected.
- Age: 13 to 23 years.
- Agility: poor (>11.5 sec).
- Participant should have played cricket for 6 months.

Exclusion criteria

Previously injured (within 6 months), unco-operative, less motivational subjects.

- Participant Taking any kind of drug therapy, Any medical conditions, any physical disability , Taking any personal training or gym were excluded.

Outcome measures were Agility

Measured using T test, Balance: Measured using Y test.

Functional performance: Measured using FMS test. The intra-class reliability of T-test is 0.98 across three trials [5]. Multiple studies have demonstrated excellent reliability of the FMS screen [6]. YBT showed good inter-rater test-retest reliability with an acceptable level of measurement error among multiple raters shows excellent reliability (ICC=0.88 to 0.99) [4]. Material and tools used were cones, civil measure tape, stop watch, Weighing machine, Stadiometer, Pulse Oximeter for Heart rate and spo2 (due to covid-19 pandemic situation)

Procedure: In the intervention, 30 participants were randomly selected using computerized randomization and allotted to two different types of physical training which is Neuromuscular training and Conventional strength training. All participants reported to wearing comfortable cloths. (Track pants, loose t-shirt, sport shoes). The test was divided into 2 days and both day's testing was divided into 3 different sessions. On the very first day, participants were undergone for checking for Height, Weight and BMI and also measured temperature, SpO2 and Heart rate due to epidemic COVID-19 situation. On the second day, 3 different testes were taken which was, T test for Agility Y test for Balance FMS test for functional performance [3]. testing stations were organized and each individual was assigned to begin at a different station. Participants were allocated the roll no. and they were going for the test in sequence. Test was taken by 3 different testers. Each participant was going for testing session, firstly for T test then Y test and then after FMS test.

Intervention protocol

Methodological procedures of the study were explained verbally and the subjects agreed to voluntarily participate in the study, signing the informed consent form. Testing session carried out 1 week before and 1 week after the intervention. The intervention lasted 4 weeks, with a frequency of 6 weekly session of 50 min. and a minimum recovery time of 24 hours between the session. Subjects were informed to were the comfortable cloths during the intervention (like track pent, loose t-shirt, shoes). In the NMT training and CST training, the intervention session was divided into 3 parts: 1) Warm-Up period 2) Training period 3) Cool-down period. The training intervention was conducted in the Shree Sai Cricket Club, Surat. For the NMT training and CST training warm-up period and cooldown period were same. In the warm-up period, there was4 min. Running 4 min. Jumping 4 min. Marching 3 min. Stretching In the cool-down period, there was3 min. Stretching 2 min. Relaxation In the training period, for the Neuro Muscular Training- the intervention training period was divided into 4 weeks. We added 9 exercises per week in progression. Like-Crawling, Pike walk, Glutei activation, Squatting, Lunging, Prone plank, Push-ups, Upper body pull, Dynamic landing. The training protocol given in table no. 1 as below. 30 repetitions decided for each exercise. For the Conventional Strength Training period, the training protocol in table no. 2 as below.

Table 1: Protocol for Neuromuscular Training

1 st Week	Quadruped knee to elbow Static Pike walk Glute abduction in standing (with theraband) Squat taps(knee) Static lunge Half plank Eccentric half press-up(knees) Band pulls single arm 2 feet slow 2 feet jump and stop (lateral and anterior/posterior)
2 nd Week	Press-up position knee to elbow Pike walk Lateral band walk Squat taps (ankle) 52 Static lunge and twist Plank Half press-up (knees) Band pulls single arm tandem SLOW 2 feet jump and stop (lateral and anterior/posterior) FAST
3 rd Week	Lizard Walk Pike Walk with half press up Lateral band walk with squat Deep squat progression Walking lunge 3-Point Plank Full Press-up down,Half-up Band pulls single arm Single leg SLOW Single leg hop and stop SLOW
4 th Week	Lizard Walk Pike Walk with full press up Lateral band walk with squat Deep squat progression 2 (hold end position for 10 Seconds) Walking lunge with A- stand Plank - ups Full Press-up down, Half-up Band pulls single arm tandem FAST Single leg hop and stop FAST

Table 2: Protocol for Conventional Training

Exercise	Description
Upper limb	Medicine ball throws Biceps curls Hand pull Hammer rows Dips
Lower limb	Squat Single-leg squat Frog squat Lunges Lunges with twist Walking lunges Box jump
Core stbility	Superman Exercise Plank and crunches Cork Hip lift
Full body	Deadlift Single leg deadlift

Fig 1: Illustrates participants performing deep squats with 10 sec holds, **Fig 2:** Illustrates participant performing Pike walk with press Up, **Fig 3:** Illustrates participant performing 3-point plank (in progression , **Fig 4:** Illustrates quadruped knee to elbow starting position, **Fig 5:** Illustrates Quadruped knee to elbow ending position**. Fig 6:** Illustrates walking lunge with A stand, **Fig 7:** Illustrates starting position of lizard walk, **Fig 8:** Illustrates components of FMS.

Statistical analysis

The statistical analysis was done using SPSS software version 22. Descriptive analysis was carried out for Age, BMI, Gender, T-Test, Y-Test and FMS . Paired T-test, was used to evaluate the difference within the group for all outcome measures. Independent T-Test, was used to evaluate the difference between the groups .The level of significance was set $p \leq 0.05$

Table 3: Illustrates Mean and Standard deviation of Age and BMI

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	30	13	22	16.53	2.403
BMI	30	18	23	19.73	1.491
GROUP	30	1	2	1.50	.509
Valid N (listwise)	30				

Table 4: Illustrates difference of Pre and post value of T test, Y test and FMS within the group

	Paired Differences Mean	T	Sig.(2-tailed)
Pair 1 T Test-pre – T test-post	1.79900	7.598	.000
Pair 2 Ytestprer – Ytestpostr	2.12533	.255	.801
Pair 3 Ytestprel – Ytestpostl	-2.53367	-.340	.737
Pair 4 fmspre – Fmspost	-2.000	-12.577	-12.577

Table 5: Illustrates Mean difference of pre and post value of T-test, Y-test and FMS Between the group.

t-test for Equality of Means			
		T	Sig. (2-tailed)
Meandift-test	Equal variances assumed	3.649	.001
	Equal variances not assumed	3.649	.001
Meandifyrestr	Equal variances assumed	-1.516	.141
	Equal variances not assumed	-1.516	.149
Meandifytestl	Equal variances assumed	-2.587	.015
	Equal variances not assumed	-2.587	.018
Meandifffms	Equal variances assumed	-5.196	.000
	Equal variances not assumed	-5.196	.000

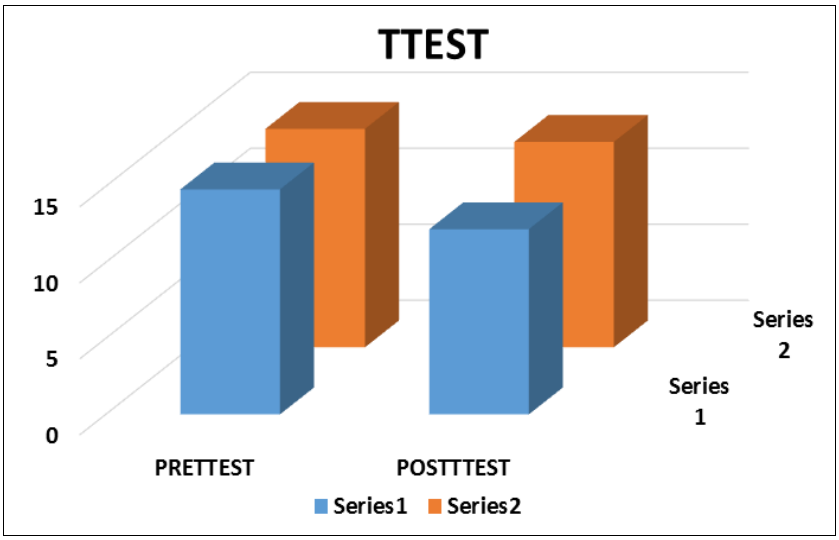

Fig 9: Llustrates difference of Pre and POST VALUE Illustrates difference of Pre and Post values of T-test within the group

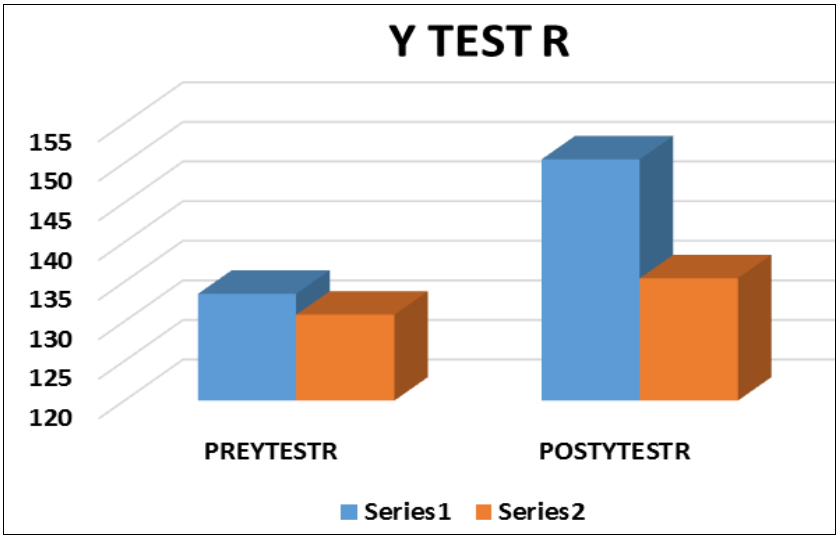

Fig 10: Illustrates difference of Pre and Post values of (Y-test in right lower limb) within the group

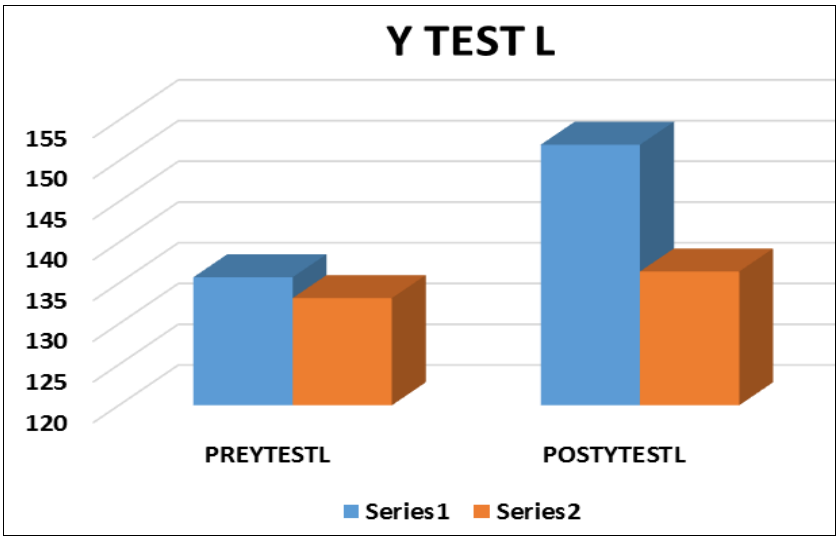

Fig 11: Illustrates difference of Pre and Post values of Y-test (in left lower limb within the group,

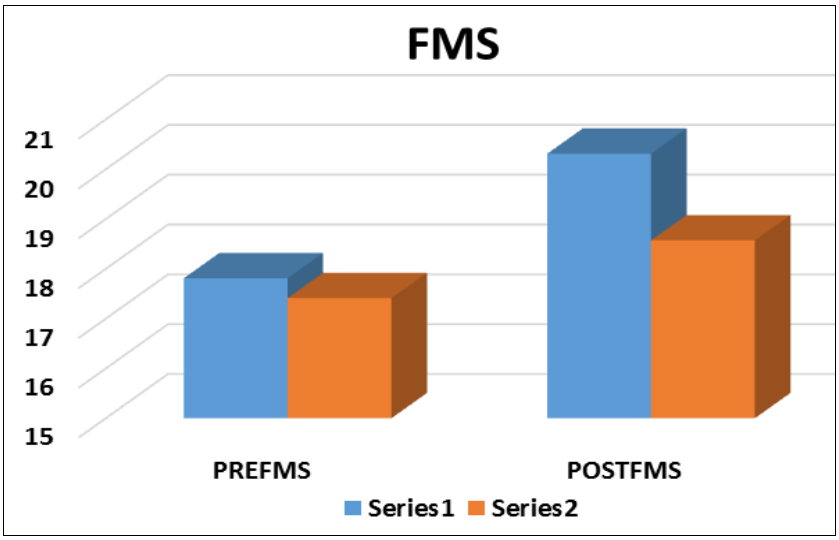

Fig 12: Illustrates difference between pre and post values of FMS within the group

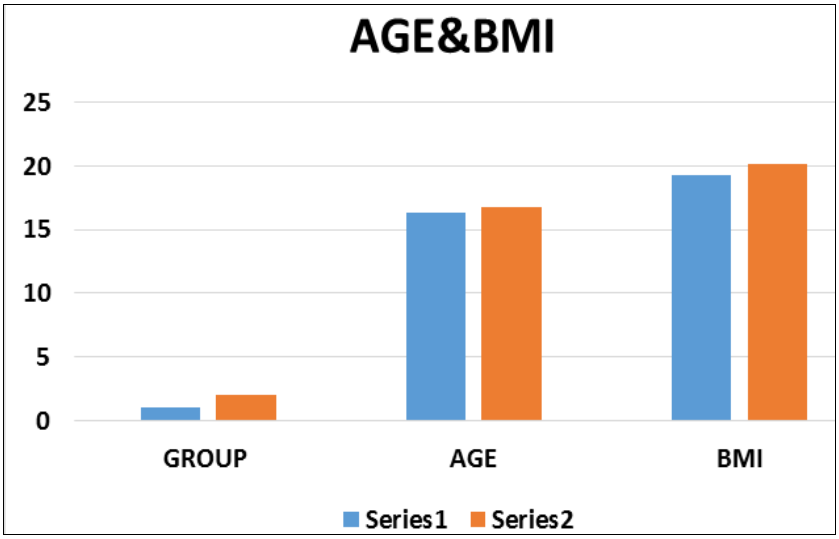

Fig 13: Illustrates mean differences of T-test, Y-test and FMS between the group.

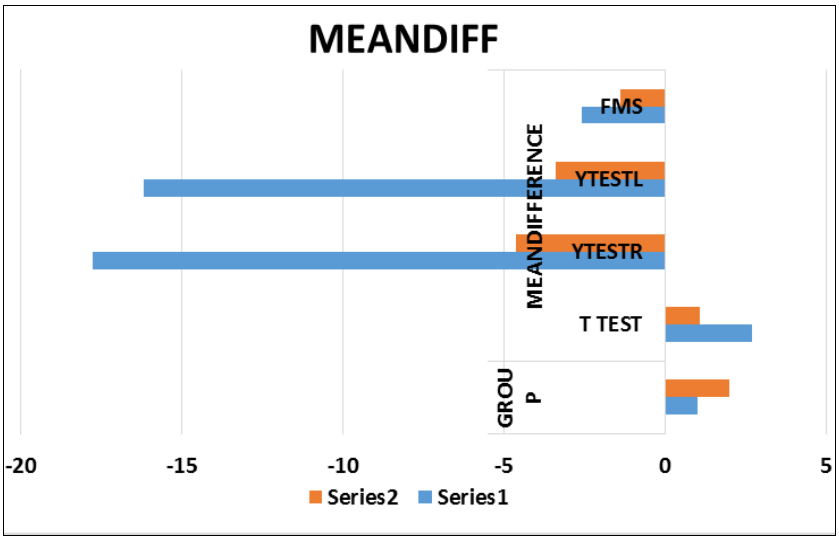

Fig 14: Illustrates Differences in Age and BMI within the group.

Discussion

This study investigates the effect of Neuromuscular training to increase agility, functional performance and had little impact on Balance in young cricketers. In Our Study we have taken two groups Group 'A' and Group 'B'. Group A were treated with Neuromuscular training and group B with conventional training. Age group from 12-22 were taken from the sports club in Surat. Only Male Athletes were taken for the study. The agility of the cricketers were measured using T-test and there was significant improvement in the pre and post values of T-test within the group as well as between the group i.e. (pre p=0.91 and post p=.113)

The balance of the cricketers were measured using Y-Test and there was significant change in the pre and post value of Y - test within the group as well as between the group in Left lower limb.(pre[p]=.000 post[p]=.953) While, there was not much significant difference in pre and post value of Y-test of Right lower limb. i.e. pre (p)=.000, post (p)=.961.

The Functional performance of the cricketers were measured using FMS (Functional Movement Screen) and there was significant change in the pre and post value within the group as well as between the group.(pre [p]=.002 post [p] =.000

Our result revealed that 4 weeks of Neuromuscular Training had a positive effect in improving Agility, Balance and Functional Performance in young Cricketers. The possible Biomechanical mechanism for improving Agility, Balance and Functional Performance could be activation of mechanoreceptors present in the inert structures as a consequence of Neuromuscular Training. Neuromuscular control and proprioception could have improved as a result of Neural Adaptation and specific training principle administered in our study [3].

How CST help in improving Agility, Balance and Functional Performance? Strength training improves muscular strength and fitness by exercising a specific muscle or muscle group against external resistance which include free weights or your own body weight. The basic principle is to apply a load and overload the muscle so it needs to adapt and gets stronger.

Limitation of the study

Only Males Athletes were included. In The present study, limited age group from (12-22) were included. The present study Sample has been taken from only one sports club in Surat. Hence the result cannot be generalized for overall cricketers.

Further Study can be done including Female Athletes. Further Study can be done for different Age groups and by taking sample from different cricket club And from the different regions of Gujarat.

Conclusion

The present study concluded that both the intervention i.e NMT and CST are efficient in improving physical fitness of adolescent cricketers including Agility, Balance and functional performance , However NMT showed more significant improvement in improving Agility, Balance and Functional performance in Young Cricketers than CST.

References

1. Katherine Herman, Christian Barton *et al.*, The effectiveness of neuromuscular warm-up strategies, that required no additional equipment for preventing lower-limb injuries during Sport participation: A systemic Review, BMC Medicine, 2012.
2. N Ponraj. Effectiveness of a Neuromuscular training in improving the agility and vertical jump performance in Hurdlers, The Tamilnadu Dr. M.G.R Medical University, Chennai, 2017.
3. Karvannan H, Prem V, *et al*. Effect of neuromuscular training on functional throwing performance and speed in asymptomatic cricket players, Manipal academy of higher education, Bangalore, February, 2018.
4. LTC Scott W. Shaffer *et al*. Y-Balance Test: A Reliability Study Involving Multiple Raters, 2013.
5. Kainoa Pauole, Kent Madole, *et al*., Reliability and Validity of the T-Test as a Measure of Agility, Leg Power, and Leg Speed in College- Aged Men and Women, Department of Kinesiology and Physical Education, California State University Long Beach, Long Beach, California, 2000.
6. Rebecca Shultz, Scott C. Anderson, et.al, Test-Retest and Interrater Reliability of the Functional Movement Screen, University of Auckland, New-Zealand.
7. Pawel LInek, Damiar Sikora *et al*., Reliability and Number of Trials of Y Balance Test in Adolescent Athletes, 2017.
8. Deydre S Teyhen, Scott W Shaffer *et al*. The FMS: A Reliability Study, Journal of Orthopedics and Sports Physical Therapy, 2012.
9. Francisco GO' Connor *et al*. Functional Movement

Screening Predicting Injuries 84 in Officer Candidate, 2011.
10. Shumway-Cook A, Anson D, Haller S. Postural Sway biofeedback; Its effect on reestablishing stance stability in hemiplegic patients". Arch. Phys. Med. Rehabilitation, 1988.