ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 11, Issue, 06, pp. 48133-48135, June, 2021
https://doi.org/10.37118/ijdr.22197.06.2021

RESEARCH ARTICLE OPEN ACCESS

THE EFFECT OF EIGHT WEEKS OF HIP ABDUCTOR MUSCLE STRENGTHENING WITH FUNCTIONAL BALANCE TRAINING ON STATIC BALANCE IN CHRONIC ANKLE INSTABILITY IN FOOTBALLERS AND CRICKETERS OF YOUNG POPULATION

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ARTICLE INFO

Article History:
Received 20th March, 2021
Received in revised form
17th April, 2021
Accepted 28th May, 2021
Published online 30th June, 2021

Key Words:
Foot and ankle disability index (FADI), Y-Balance Test, SEBT score, Functional Balance training, Functional Ankle Instability, Single Limb Stance Test.

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ABSTRACT

Aim: The aim of this study was to determine the effect of eight weeks of hip abductor muscle strengthening with functional balance training on static balance in chronic ankle instability in normal population, footballers and cricketers. **Design:** Pre-test post- test experimental design. **Material & Methodology:** A total of 100 subjects (50 footballers, and 50 cricketers) with self-reported CAI were recruited according to the inclusion and exclusion criteria. The related studies were held in Launchpad India Delhi, Shree Hospital Delhi after the coordination with the province officials' permission in order to gather the related data. The foot and ankle disability index (FADI) questionnaire are distributed and gathered only one day before the beginning of the protocol. **Results**: The present study provided the description of effect of eight weeks of hip abductor muscle strengthening with functional balance training on static and dynamic balance in chronic ankle instability in normal population, footballer and cricketer of young population. **Conclusions:** The results of this study demonstrate that regardless of different training groups (Footballers, and Cricketers), statistically significant improvements in balance were achieved by all the groups. Following the training the SLST time significantly improved in both the training group. Footballers presented marginally better improvement in static balance as compared to Cricketers as assessed SLST.

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Citation: Keshav Kumar Kant, Dr. Ajeet Kumar Saharan, Manisha Saharan, Ashok Kumar and Tanubhrit Singh. 2021. "The effect of eight weeks of hip abductor muscle strengthening with functional balance training on static balance in chronic ankle instability in footballers and cricketers of young population", *International Journal of Development Research*, 11, (06), 48133-48135.

INTRODUCTION

Ankle sprains are very common not only in the sporting population Fong DT et al (2007) but also in the general community Bridgman SA et al (2003). Although the acute symptoms of ankle sprain resolve quickly, many people report persisting problems, such as pain and instability van Rijn RM (2008). Chronic ankle instability (CAI) is one of the most common of these residual problems and has been defined as "repetitive bouts of lateral ankle instability resulting in numerous ankle sprains" Hertel J (2002). Despite the high prevalence of CAI, it remains a phenomenon that is poorly understood by researchers and clinicians alike. This has resulted in inconsistencies in terminology, definitions, and in hypotheses about impairments Hertel J (2002), relationships among the impairments Hubbard TJ (2007), and the relative contributions of the impairments to activity limitations and participation restrictions. Balance is defined as the ability to maintain the center of body mass within stability limits largely determined by base of support Shumway-Cook et.al. Postural control (or balance) can be defined statically as the ability to maintain a base of support with minimal movement, and dynamically as the ability to perform a task while maintaining a stable position (Winter et al., 1990). This ability is influenced by a complexity of factors, that are sensory information (from somatosensory, visual and vestibular systems), joint range ofmotion (ROM), and strength (Grigg, (1994), Nasher et al. (1982), Palmieri et al., (2003); Palmieri et al. (2002), and it is responsible for the correct execution of complex sport movements, as well as for protection against injuries.

MATERIALS AND METHODS

A Pre-Test –Post Test Experimental Design was carried out to see the effect of eight weeks of hip abductor muscle strengthening with functional balance training on static balance in chronic ankle

instability.Total of 100 samples are recruited for the study. Out of these 100 samples 50 cricketers, and 50 footballers were selected.

Group 1- Footballers (50 subjects)
Group 2- Cricketers (50 subjects)

Inclusion criteria: Males ofage group: 18-30 years, Subject having a history of more than one ankle sprain and residual symptoms, including episodes of the ankle giving way.Subjects will self-report symptoms of disability due to ankle sprains qualified by a score of 90% or less on the Foot and Ankle Disability Index (FADI) and the FADI Sport surveys.If a subject reported bilateral ankle instability, the self-reported worse limb was used for analysis and training.

Exclusion Criteria: History of head injury (concussion) within the previous 12 weeksRenstrom P AFH, Konradsen L (1997). Subjects having history of lower extremity injury, including ankle sprain within the past 6-week, history of lower-extremity surgery, and balance disorders, neuropathies, diabetes, or other conditions known to affect balanceLevangie PK, Norkin CC (2001).

Tools and measuring method: Measuring tape, 30cm box, Treatment table, Stop watch, Protractor, Theraband (blue), Ink pad, Micropore

Procedure: All subjects were given aquestionnaire to fill out regarding their previousankle injuries, and the Foot and Ankle Disability Index (FADI). Healthy subjects must score 100% on both sections of theFADI; while CAI subjects must score less than 90% on the FADI. ADL section and lessthan 80% on the FADI sports section McKeon (2008). All subjects read and signed an informedconsent form that was be approved by the University Institutional Review Board.

Statistical analyses: All data were analyzed using statistical tests, which were performed using SPSS 19.00 software package. Demographic data of subjects including age and gender, involved and dominant leg were descriptively summarized to project the results. The dependents variables for the statistical analysis were analyzed using parametric tests like Independent T-Test and Paired T-Test.The data was analyzed both between and within the groups. A 0.05 level of significance was used for all comparisons.

RESULTS

Descriptive data: 150 samples (50 footballers, and 50 cricketers) were recruited for the study. Mean and standard deviation of age and Right lower Limb (RLL) were given below. (Table 1).

Table 1. Descriptive Statistics for the Variables

	AGE		RLL	
	MEAN	SD	MEAN	SD
G1	23.66	0.36	86.00	1.16
G2	23.34	0.39	85.00	0.91

Within group comparisons of SLST for both left and right legs: Mean and SD of pretest and posttest composite scores of SLST test for both left leg and right leg in both groups were given below in Table 2. and Figure 2.

Table 2. Within group comparison of SLST

Group	Slstr0		Slstr8		Slstl0		Slstl8	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd
G1	15.6	0.95	24.0	0.67	14.2	0.99	22.6	0.84
G2	12.9	0.77	20.0	0.64	15.5	0.75	22.6	0.72

DISCUSSION

The primary purpose of this study was to determine which group (Footballer, and cricketer) will perform better when training balance for chronic ankle instability. The overall result of this study shows that all the trainings groupsare getting effective results when training balance for chronic ankle instability. The results shown that there was no difference in improvement pattern for static balance as assessed by Single Limb Stance Test in both the groups. However, both groups improved statistically significantly from day 0 to week 8.

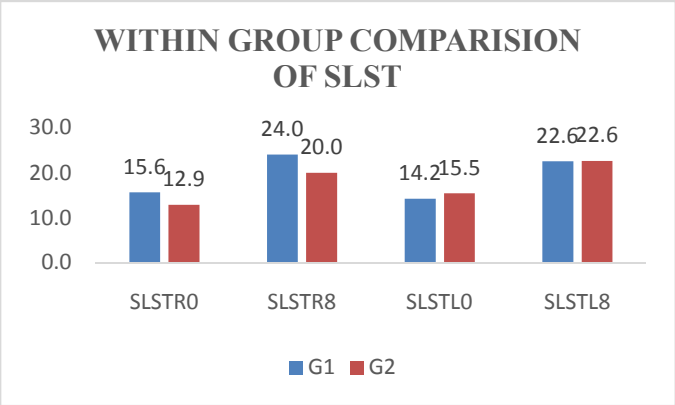

Figure 1. Within groups comparison of SLST

The results of this study demonstrate that regardless of different training groups (Footballers and cricketers), statistically significant improvements in balance were achieved by all the groups. Following the training the SLST time significantly improved in the both the training group. Various reasons can be attributed to the improvement in static and dynamic balance within each group.To ensure a better quality of life and optimum success in professional sports, an acceptable degree of versatility is required. In certain sports requirements, flexibility is now recognized as a valuable part of an athlete's physical fitness program for the purpose of injury prevention, improved and successful results, or quicker and safer recovery, regardless ofachieving great flexibility as a fundamental motor abilityThomas B. Michell et al (2006). It has been discovered that the plantar surface of the foot plays a critical role in providing sensory input to central nervous system for balance and postural control. There are different types of mechanoreceptors present on the sole of the foot, which are responsible for sending somatosensory inputs to the brain by sensing pressure and stretching motion in the tissues that surround them. These plantar inputs are the dominant sensory information for balance when the body is standing still on a fixed firm surface or moving through the environment. Weight bearing exercises also stimulate joint mechanoreceptors leading to improved proprioceptive inputs and hence proprioception.

Our subjects might have developed new long-term muscle activation patterns after functional balance training. Muscle activity has improved after coordination training with static and semi-dynamic exercisesOsborne et al (2001), Thomas (2006). Osborne et al (2001) reported decreased onset latency of the tibialis anterior muscle after ankle disk training in subjects with FAI. In addition, Eils and Rosenbaum(1991-1998) suggested that co-activation of ankle muscles increased in subjects with FAI after coordination training. This improved co-activation might have been responsible for improving postural stability in subjects with FAI. Based on the results of these studies, we contend that postural stability improvements might have resulted from improved foot and ankle muscle activity after 4 weeks of training. This improved muscle activation likely occurred while subjects were performing the exercises with the short-foot technique, as well as while subjects performed single-limb testing without the use of the short-foot position. Subjects might have increased activation in muscles responsible for performing the short-foot maneuver without actually shortening the A-P plane of the foot and narrowing the M-L plane of the foot during single-limb stance tests. We had our subjects performed functional balance exercises while using the short-foot position for 12 sessions over 8 weeks, which might have allowed our subjects more time to learn new muscle activation patterns associated with this technique. In addition, our subjects were instructed not to shorten and narrow the arch of the foot during single-limb stance tests, allowing them to concentrate on

remaining as motionless as possible during the tests. The design of our study did not allow us to determine the effectiveness of the short-foot maneuver, as our results indicate that the functional balance exercises were responsible for postural stability improvements. Based on previous coordination training reports, we expected postural stability to improve after 8 weeks of functional balance training in subjects with FAI. Our functional balance training likely introduced new movements and muscle activation patterns to subjects and might have provided enough stimuli to improve postural stability in all subjects. In addition, neither subjects with stable ankles nor those with FAI had previous experience performing these exercises with the short-foot position. All subjects, regardless of ankle stability, might have responded to functional balance training similarly as a result of being introduced to these new movements and muscle activations for the first time. The main findings of this study are in accordance with the conclusion of Thomas B. Michell et al (2006). They reported that Postural stability improved after subjects performed functional balance training programs, both with andwithout Exercise Sandals.However, findings of this study were not in accordance with conclusion of Rothermel et al (2004).They reported that 4 weeks (12 sessions) of single limb balance training with the short-foot manoeuvre did not improve single-limb postural stability in healthy subjects, whereas training without the use of the short-foot position did improve single-limb postural stability in healthy subjects. Rothermel et al (2004). Speculated that the short-foot technique might have caused their subjects to focus on muscle contractions instead of remaining as motionless as possible during single-limb stance tests. Football players and cricketers have more leg and back strength. Exercise and rigorous training in sports and the use of legs for various activities such as kicking, jumping, tackling contribute to improved strength. Our study coincides with the study Berg K, Richard W. Latin, who states that leg and back strength is more in football players (p≤005)Berg K, Latin Richard W (1995). Core stability and strength are required for trunk rotation and postural control while standing or moving. The strengthening of trunk or core stabilizing muscles has significant importance for daily life activities, athletic performance, and the rehabilitation andprotection from LBP. The Canadian Society for Exercise Physiology (CSEP)recommended to instability resistance exercise to train core muscles for athletes and sedentary people. On Single Limb Stance Test, static balance improved in both the groups in almost similar pattern. No differences existed between the three groups when measured on SLST. The inability to maintain quiet stance during SLST has been consistently been shown to be associated with ankle instability. One important observation of this study was that significant improvement occurred from day 0 to week 8. These findings suggest that 8 weeks of training is sufficient time to promote reflex muscular activation patterns necessary for the maintenance of posture and balance Rozzi (1999).In our study 73.33% subjects suffered from functional ankle instability in their dominant leg. Ekstrand and Gillquist (1983) found that the dominant leg sustained significantly more ankle injuries than the non-dominant side in male soccer players. But, Beynnonet al (2001)found no influence of limb dominance on ankle sprains in the study of collegiate soccer, field hockey, and lacrosse athletes.

Limitations

- Larger sample size would have brought in more clarity in observed trends.
- Due to lack of funds and infrastructure, many of the resources like EMG Force plate, and Biofeedback could not be used to make the results clearer.
- The various activities of the subjects during the course of study were not completely under control. Though the subjects were instructed to continue only with their regular activity and were asked to report participation in any new activity.

Future scope

- Generalizability of the results should be increased by carrying the study on large sample size.
- Studies can be done for longer durations (12-16 weeks), to make the picture of results clearer.
- EMG, Force plate, and Biofeedback can be used to make the results clearer.

Conclusions

Sports physiotherapist, sports trainers, coaches and others in situation where they are unable to decide which type of training is more beneficial for their athletes having CAI, they should be aware of the impact that Functional balance training with Gluteal Muscle strengtheningis effective in improving static balance. However,Footballers can give better results than that of Cricketers in improving static and dynamic balance. Thus, we can say that Functional Balance Training with Gluteal Muscle strengthening is clinically relevant for the rehabilitation of chronic ankle instability.The results of this study demonstrate that regardless of different training groups (Footballers and Cricketers), statistically significant improvements in balance were achieved by both the groups. Following the training, SLST time significantly improved in the both the training group.

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