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Establishing Balance and Proprioception by Bosu Ball Training Versus Conventional Training in Soft Tissue Injuries of Knee Joint

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ABSTRACT

Background: To Enhance Balance And Proprioception After Lower Limb Injury In A Short Span Of Time Which Is Highly Required To Compete The Skills In The Rehabilitation Process.

Objective: An Attempt Of The Study Is To Determine The Effects Of Components Like Balance And Proprioception In Individuals Sustain Soft Tissue Injuries Of Knee Joint And With The Aim To Return To Pre Injury Level Or Competitive Training To Establish The Professional Skills. The Prospective Study Has Been Aimed To Explore The Functional Outcomes Based On Unstable Platform And Conventional Training Which Have Been Challenging After Sustaining Knee Injury And Essential Movements Needed To Achieve Pre Injury Level And Performance.

Eligibilty Criteria And Methodology: Depends On Selecting Individuals Who Met With Soft Tissue Injuries Grade1 And Grade 2 Of Knee Joint Will Be Identified And Confirmed By Investigation. Patients With Internal Derangement Of Knee, Fractures Of Knee, Third Degree Soft Tissue Injuries Are Excluded In The Study. The Study Based On The Effects Of Bosu Ball Training And Conventional Training In Improving The Components Of Balance And Proprioception Essential For Neuromuscular Control In Young Athletes Of Six Weeks Training. Before And After Training Have Been Recorded In Various Directions In The Concept To Record Components In Concordance With Neuromuscular Control Of An Individual. Individual Have An Exploration Of Six Weeks Training In The Division Of Rehabilitation. The Quantification Of Balance And Proprioception Relies On Star Excursion Balance Test (Sebt) In Measuring The Components Of Lower Extremity. In Sebt Neuromuscular Control Have Been Explored By Establishing Balance In One Foot And Other Foot To Propel In Multiple Directions To Record The Integrity Of Lower Extremity.

Key Points Based On Intervention: Balance And Proprioception Are Motor Skills Considered As Major Components For An Athlete To Return To Sports. Rehabilitation Protocol Comprises Of Conventional Training And Training On Unstable Platform. The Components Of Motor Skills Gained Through Neuromuscular Training Has Become The Pivotal Role For Field Performance..

Keywords: *Athlete, Training, Knee Joint, Rehabilitation, Motor skills, Balance, Proprioception.*

1. INTRODUCTION

The Anterior Ligament is one of the two cruciate ligament provides stability to the weight bearing joint in the lower limb. The Function of ACL is to trace the direction of movement of the Knee joint and to establish the components essential for kinematics of Lower limb. Most of the ACL Injuries occur in association with Meniscal injuries called Concomitant Injuries or Unhappy triad. The mechanism of injury has been categorised in three ways 1. Direct contact 2. Non-contact Injuries in which injuries occur more often while foot firmly placed on the ground (1). The Major contribution of ACL in stabilization of knee joint especially in relation to pivoting cutting and deceleration movements are significant. Forces placed on the ACL are extensive by 30 percent of terminal extension and hyperextension. Acts as a primary constraint in rotary control and limits tibial rotation as well as secondary restraint to valgus and varus stressors during the entire range of motion of knee (13). Anterior Cruciate Ligament is one of the most extensively studied condition which requires intervention to improve quality of Individuals with ACL Injury. Anterior Cruciate Ligament insufficiency becomes disability sometimes affects the constraints on sports participation and reflects negativity in Sport (12).

Balance is an integral part of daily pursuit. The academy of sport has concept of Balance as highly coordinated dynamic process collectively involving multiple neurological pathway that makes COG to associate with BOS. Certain factors responsible for bringing Balance are somatosensory visual vestibular systems and motor responses influence coordination joint range of motion and strength (13).

The Significance of performance and injury prevention relies on the components of optimal balance and stability of Musculoskeletal system. There is enormous methodologies and exercises incorporated for training devices. In this regard unstable platform serves in promoting force production and core strength (3). It has been coded in Article (18). Specific movements have been needed for the establishment of Dynamic qualities to cope up with the challenging skills and the physical activities have been associated with fundamental skills for athletic performance are endurance balance flexibility and coordination. While repeatedly practising and extensively working on the field leads to the development of the skills in an evolving situation. Physical therapy for ACL sprain injuries has the significant part in related to area and severity of Sport injuries. The ACL Sprain must receive medical for the betterment of an individual to return to daily life and an athlete to return to field (10). The Physical therapist intervention with the main ambition of curative and rehabilitative health disorders. Rehabilitation programme comprises of four phases which creates an impact on patient functional activities and return to daily life. Each phase has different exposure as needs of the patient and targets of the differ. The first second and third phase of the exercise will work to relieve the pain and to increase muscle strength. As intervention based on both modality and exercise in the form of standing leg lifts and the final phase seeks the advice of physical trainer and physical therapist (1). The fourth phase concentrates on stabilization exercises and muscle strengthening. This phase becomes the appeal for return to sports or competitive skills. Rehabilitation has been reported that return to play guideline have the strategies of gold standard and determined as multidisciplinary approach and it is based on multitude of factors of objective examination of data, a return of sport or functional testing battery biological tissue healing psychological readiness demands of the sport or functional testing battery biological tissue healing psychological readiness demands of the sport and patient specific factors such as concomitant injuries and comorbidities. To minimize the restrictions for sport activities includes knee valgus and internal rotation, hip drop heavy or stiff landings loss of balance. Hence various practices progress towards return to play in agility and plyometric drills on the sport field (6).

2. METHODS AND DATA EXTRACTION

The Study relies on the effects of Bosu Ball training and Conventional training in improving the components of Balance and proprioception in young athletes sustain grade 1and grade 2 soft tissue injuries of six weeks training have been recorded in multiple directions in the concept to record components in concordance with neuromuscular control of an individual. Individual have an exploration of six weeks training in the Division of Rehabilitation. Individuals have recruited by Random allocation method of 15 individuals in each group. Group1 to undergo Bosu Ball Training and Group2 to undergo conventional training. The quantification of Balance and proprioception relies on Star Excursion Balance Test. Pre and Post training values are recorded in both the group under training. A consent has been taken prior to intervention follows six weeks training. A warm up programme of ten minutes follows exercises each day of five days practice in a week.

A Conventional training as Exercise featured in this study has been part of the ACL Rehabilitation. A Background of component includes balance and speed have been emphasised in exercising the patients enrolled in ACL Rehabilitation (11). Focus on rehabilitating the injured knee by stabilization, Neuromuscular patterning and by repetition of training (7). Proprioceptive enriched exercises and stability training are introduced priorly in rehabilitation protocol and progress to advanced exercises as health of the patient permits. Functional based movements are under implication along with sports specific movements later in the phase of rehabilitation. Functional activities in Rehabilitation comprising of power and endurance of lower extremities multiplanar movements with increased neuromuscular and proprioceptive (15). A complete Rehabilitation following ACLR to recover successfully and to mitigate the impairments are mandatory.

Bosu Ball is an equipment which gains popularity in developing the basic skills required for different activities in Sports

performance. Bosu Ball is regarded as core exercises with handy piece of equipment (17). Bosu Ball is a hemisphere made of rubber has been mounted on solid based platform and prominent lines which makes restriction and act as a guard for performing slipping from the ball. The Bosu Ball regarded as important platform in developing core strength balance and body awareness (14). Hence the Bosu Ball in developing performer skills to meet the requirements in sport field. Research suggested the unilateral stance on Bosu ball can establish neuromuscular system essential to withstand balance. The study coded that Balance training on unstable surface comprising of concentric and eccentric muscle contractions muscle contractions proprioception as well as coordination becomes the components in deriving balance scores on SEBT as an exposure of four weeks training proves significance through results p=0.001.

Bosu Ball protocol (Group 1)

Exercise	Repetitions
Double limb stance	1 Min
Anterior/posterior Tilts	10
Medial/ Lateral Tilts	10
Knee Flexion	10
Lunges	10
Single Limb stance	1 min

Exercise Protocol (Group 2)

Exercise	Repetition
Double limb Stance	1 Min
Anterior/Posterior Tilts	10
Medial/Lateral Tilts	10
Knee Flexion	10
Rotations	10
Single limb stance	1 Min

Groups undergone training with performance of 3 set of all exercises mentioned in the protocol (Jagruti et al., 2020). The Quantification of Balance and lower extremity movement in Rehabilitation relies on Star excursion balance test a functional tool standardised in clinical practice in measuring the components required for professional skill. In SEBT neuromuscular control have been explored by establishing balance in one foot and the other foot to propel in multiple directions to prove the integrity of Lower extremity.

STATISCAL INTERVENTION

	1	2	3	4	5	6
Pretest	77.73	78.00	0.533	1	0.533	0.02
	5.14	4.73	720.93	28	25.73	
Post test	97.07	78.13	2688.53	1	2688.53	22.56
Adjusted post test	97.16	78.04	2740.69	1	2740.69	261.25
			283.25	27	10.45	

The table depicts pre and post values respectively based on mean scores derived from Star Excursion Balance test. The obtained F ratio of 0.02 for pretest is less than the table value of 3.222 for df 1and 8 required for the level of significance at .05 level of significance on balance in SEBT. The Post test mean value by SEBT score 97.07 and 78.13 respectively. The obtained F ratio of 22.56 for post test score is greater than the table value of 3.222 for df 1 and 28 respectively. The adjusted post score on 77.73 and 78.00 respectively. The obtained f ratio of 261.25 is greater than the table value of 3.226 for df 1 1nd 28, In the adjusted test score f ratio 22.56 is greater than the table value of 3.222 for df value 1and 2 respectively. The

result of the study reveals the significance in the value of pre and post scores in between Bosu Ball training and conventional training. The Bosu Ball training proved to be significant in the duration of six weeks training. To determine the significance among the two-group post hoc test applied and results established in the table.

The result of the intervention revealed improvement in SEBT scores in all multiple directions i.e. in all eight directions by utilising the both training namely Bosu Ball and conventional Training. A minimum which exists between two sorts of training. The Bosu Ball shows significant changes in this duration comparatively to the Conventional Training. The study shows both the intervention can be utilised to gain the neuromuscular components like balance and proprioception and has been evident through the Star Excursion Balance Test follows six weeks of training.

Here ANCOVA the statistical application has been utilised to test the main and interactive effects of training or categorised dependent variables on a continuous variable. Hence the co-variates determine the effect of training or categorical dependant variable on a continuous variable. Hence the co-variates determine the effect of intervention among athletes.

3. DISCUSSION

By utilising Bosu Ball and conventional Training impact has been reflected in multiple directions of SEBT scores in athletes. The study correlates the relationship exist between Neuromuscular components essential to withstand competitive training in sports.

Elevation of sport life based on functional activities which is possible only by the biomechanics of the body allow. Ensure the field activities through shock absorption and control of valgus stress at knee while doing field activities Double limb activities requires some progression of balance and proprioception and single limb activities are the advance level of performance. Hence pivoting cutting multiple lunges and hops requires the control of frontal and sagittal plane and return to sport based on these activities (5). The Significance of Rehabilitation lies on an attempt to restore the knee extensor muscle strength residual deficits in knee extensor muscle size and strength after injury has been associated with poor biomechanics, reduced knee function, elevates the risk of injury. In the part of biomechanics proximal dysfunction alter the biomechanism and the patients with anterior knee pain results in deficits of hip abduction extension &external rotation strength and functional capabilities. As the rehabilitation has been formulated to ease the deficits.

The Balance Training has its quintessence on concentric muscle concentration proprioception as well as bringing the production scores in SEBT. Training related to exercises employ all modes of contraction and headway which utilises both open kinematic chain exercises to initiate strength of isolated muscle contraction and headway to functional training. These are the recommendations to make the practitioner sustain in rehabilitation practice and enhance better outcome based on Neuromuscular training (6).

4. CONCLUSION(S)

Hence Balance becomes an integral part of musculoskeletal system and relies on Star excursion balance test for quantification of component needed as an athlete. Star excursion balance test (SEBT) provides broad information about the deficits based on various directions. Though balance becomes challenging one to establish it serves as core component to determine motor skills required for sports performance. The performance of SEBT makes the individuals to work in multiple directions and records the scores based on it. This specifies the deficit of the ligament which lacks and certain movements are restricted. This serves as the guideline for health care professional to work on the core muscles to improve the skills of Athlete and to set the goals in the initial stage of training and improvement in the final stage of training.

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