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INTRODUCTION
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Volleyball is a demanding sport that requires the body to be able to create and accept force from the ground, along with taking numerous one arm swings. This combination can be taxing on the body. That’s where sports performance training comes into play. We all understand that volleyball players need to jump high and hit hard. But their specific training needs might be to develop a better landing, or to get the shoulders in the optimal strength position to withstand numerous swings. Then we have an efficient, well-tuned athlete that can perform optimally and effectively.

1.1. Battle rope training

John Brookfield is view of the Battling Ropes spread like wildfire into different areas of strength training and conditioning, and since "Battling Ropes" is a trademarked system, the ropes themselves had to take on new names which is why you'll hear them called battle ropes, workout ropes, or heavy ropes. While John Brookfield focused on perfecting the workout which we are extremely grateful for, Muscle Ropes has focused on perfecting the ropes Josh (2013).

Ropes are significant that they create a dual-force dynamic effect, one that uses the force of gravity and the force created by rope waves to amplify and improve all of the human systems physiological response. Today most of the people implements using through rope to increase the effects of gravity on the body, creating a physiological response from the systems in the trainer, student, or person is trying to improve or build adaptations. For instance, if a body builder is trying to grow adaptations in his or her
musculature, he or she will create moderate to excessive load on the musculature (as well as cardiovascular, pulmonary, and nervous systems) day after day and week after week using gravity-based implements (i.e. barbell, dumbbell, etc.), and it works. If a runner is trying to improve his aerobic capacity or endurance, he will run (gravity-based load and exercise) day after day and/or week after week to build adaptations in the muscular, cardiovascular, pulmonary, and nervous systems to improve aerobic capacity/endurance. In this way, ropes are significantly different. The coach, student, or a person is able to amplify load in two directions: gravity (and the many ways we know how to leverage gravity because of the lifters, coaches, and trainers that came before us) and wave force (which is a new field of physiological pursuit, providing myriad ways to improve our body’s adaptation response) Aaron Guyett (2016).

The dual-force effect and contra lateral movement common to rope use can accelerate adaptation in the body, while curbing injuries because each person is limited by their own force production. Much like jumping, if we cannot create enough force to get off the ground, or our nervous development disallows proper timing and sequencing for us to get off the ground, it will be hard to get injured. We cannot create enough force through jumping or landing to be injured (note: most people injure themselves landing in the jump sequencing, because their focus is only on the first part of the movement—the jump, but that is a topic for another time). With battle ropes, it is far less detrimental, because there is a constant connection to the two force producers (rarely in battle ropes training is the athlete off of the ground or disconnecting the chain of force and then reconnecting with it at high level forces), and it can be as explosive or dynamic as the athlete is able to produce force, thus creating the opportunity to grow endurance, strength, power, and skill without a
ceiling. Whereas if an athlete runs out of an external load such as dumbbells to provide the adaptation effect, you would have to purchase another dumbbell with a higher load, or figure out a way to leverage gravity in an increasing way. This will hardly be a problem with the ropes as the force is self-inflicted Aaron Guyett (2016).

The dual-force dynamic the areas, which tend to be weak, or strengthened: your grip, shoulders, core, hips, knees, feet, ankles, and mind. Your grip strength and grip endurance must increase as your ability to produce higher force in your waves increase. Just like loading up more weight on a barbell, as your waves increase in size, speed, distance, or duration, they increase the force through the rope, requiring a stronger grip in order to not let the rope not slip out of your hands. The shoulders should stay in a fairly “packed” position, with your elbows lower than your shoulders, and tight to the sides of the body when first starting with rope waves (it should go without saying that the athlete will have neutral spine and the shoulders down and back – think big chest), this not only prevents injury, but it does wonders for the shoulder strength and stability. Innovative Results have been known to use the ropes as a way to prehab and rehab shoulders back to their fully optimized state. The core (or torso to include shoulders and hips) is mobilized, stabilized, and strengthened through repetitive rotation and anti-rotation involved in the basic battle rope alternate wave. This is a contralateral movement (left lower limb moves in sequence with the right upper limb and vice versa), which is how the body works when walking, running, crawling, swimming, and cycling, only instead of just a gravitational load, the body experiences the load of the wave as well Aaron Guyett (2016).

Fitness mobility must come before stability, and stability before endurance, strength, and power. Any mobility sequence from Onnit or Innovative Results will suffice,
but the athlete should focus on the above weak areas. As the mobility in the grip, shoulders, core, hips, knees, foot, and ankle increase, the athlete will see a dramatic improvement in his or her performance. Start the training session with dynamic mobility (stretching through movement), and end the sessions with either more dynamic mobility or static Aaron Guyett (2016).

Creating waves, pulling the ropes, or lifting the ropes stability is generated. Think of the ancient sailor on a ship, pulling, lifting, wrapping, and tying ropes all around the ship as a means to an end. once probably are not thinking of an unstable, off-balance character. Through these repetitive movements, the sailor becomes very stable and very strong, in both his lower body and his upper body. We experience this same level of stability as we continually put the dual-force dynamic through all of our physiological systems Aaron Guyett (2016).

1.2. Slackline training

Slacklining, the art of walking along one-inch wide nylon webbing, is a new school variation of circus style tight-rope walking. Born along chain link fences in Yosemite Valley, the sport of slacklining has become a recreational phenomenon enjoyed worldwide, from the beaches to the highest alpine spires.

A slackline gets its name because although the line is tensioned very tightly between two anchor points, it is not rigidly taut due to the dynamic nature of the nylon webbing. As you walk out on the line the webbing stretches underfoot and hence it feels “slack” compared to a rigid tightrope cable that does not stretch. The squirrelly and seemingly unpredictable movement of the line is makes slacklining the ultimate balance
challenge. Once entire mind, body, and soul are needed just to stay balanced, let alone walk the line.

The average slackline is set up between trees or posts at a beach or park and ranges from 15 to 100 feet in length. The tension of the line varies based on your equipment and desire. A tight line is easier to walk, but the rubbery bounce of a slightly looser line can be rewarding. There is always a great deal of energy in the line so getting aggressively bucked off is not uncommon. To avoid injury, most slacklines are set up within a few feet of the ground.

While rope walking has been around for thousands of years, the familiar art of slacklining along a taut length of tubular nylon webbing was invented in the early 1980s by two Yosemite rock climbers, Adam Grosowsky and Jeff Ellington. The pair picked up on the idea after walking along loose chain fences on rainy days in the Valley. Hooked on the challenge, they strung up old climbing webbing between trees around their campsites at Camp 4, the traditional campground for Yosemite climbers for over 40 years. Voila! The slackline was born.

According to Kevin Walker Adam and Jeff’s slackline antics started to draw the attention of other Yosemite climbers. Their attempt at walking on a steel cable across the gap between the Valley rim and Lost Arrow Spire, a 2900-foot deep chasm that’s 55 feet across, was especially impressive. Several more climbers began slacklining that summer, but only a select few really developed a passion for it. One of the most inspired was a young climber named Scott Balcom. Returning to Southern California that fall, Scott and a few friends started practicing religiously and experimented with different types of
slacklines. Soon Scott’s skills were dialed and he began focusing on the goal inherited from Adam and Jeff – to walk across the Lost Arrow Spire gap. For practice, Scott’s crew set up a 22-foot slackline underneath a highway that spanned an 80-foot drop. Using doubled lines for added strength, and harnesses and a tether to escape from would-be fatal falls, this “highline” was a first of its kind. In 1984, Scott returned to Yosemite set on conquering the Lost Arrow chasm. Skilled but unable to escape his fear, the exposure proved too daunting and Scott was unsuccessful. Throughout the next year Scott trained both harder and smarter, focusing on visualization and distance perception. The training paid off and that next summer, in July of 1985, Scott became the first person to walk the gap from Lost Arrow Spire to the Valley rim.

Slacklining is a great way to improve once balance. Considering its roots in Yosemite Valley, it’s not difficult to see how slacklining goes hand in hand with climbing training regimes. However, the full extent of its impact on sporting performance is understated. It is no small coincidence that athletes from a multitude of disciplines and sports have caught on to the training benefits of slacklining, especially in sports demanding a refined sense of balance such as snowboarding, skiing, surfing and wakeboarding. Among more extreme sports, where technique is key, balance is not only essential in relation to improving skill and proficiency, it also contributes to injury prevention - there is a correlation between good balance and less frequent dangerous and uncontrolled wipe outs.

Slacklining is a great activity to assist with poor posture, muscle imbalances, as well as the ailments that are associated with it - in particular slacklining has been shown to address neck and back pain. Moreover, the dynamic aspect of slacklining allows for
specific posture focused training - perfect for stance muscle and balance training for both snowboarding and skiing. Stance training on a slackline encourages coordination and enhances core and lower body strength through consistent, intense engagement of muscles.

Slacklining as an activity can be readily incorporated into rehabilitation and injury prevention programs, and it is not surprising that sports physicians and physiotherapists are implementing slacking to target damaged muscles and rehabilitate sporting injuries. Used for rehabilitation, slacklining has been shown to provide substantially enhanced muscle activation, with significantly reduced perceived effort in comparison to traditional kinetic open and closed chain exercises. Furthermore, slacklining initiates a neuromuscular response stimulated by the activation of full body muscle groups. Studies have also shown that not only can slacklining be used for rehabilitation exercises, but the activity also acts as a prophylactic. The Gibbon Fitness Line or alternatively the Slackrack Fitness Line are both the perfect choice and come with hand grips for comfortable pushups, a stretch band for resistance exercises and a poster with highly effective exercise suggestions developed with sport scientists and physiotherapists.

1.3. Styles of slacklining

Urban lining or urban slacklining combines all the different styles of slacklining. It is practiced in urban areas, for example in city parks and on the streets. Most urban slackliners prefer wide 2-inch (5 cm) lines for tricklining on the streets, but some may use narrow (5/8 or 1 inch, 1.6 or 2.5 cm) lines for longline purposes or for waterlining. Also see the other sections of slackline styles below. One type of urbanlining is timelining, where one tries to stay on a slackline for as long as possible without falling down. This
takes tremendous concentration and focus of will, and is a great endurance training for postural muscles. Slackline handstand and another type of urbanlining is streetlining, which combines street workout power moves with the slackline's dynamic, shaky, bouncy feeling. Main focus are static handstands, super splits — hands and feet together, planche, front lever, back lever, one arm handstand and other interesting extreme moves that are evolving in street workout culture.

Tricklining has become the most common form of slacklining because of the easy setup of 2-inch (5 cm) slackline kits. Tricklining is often done low to the ground but can be done on highlines as well. A great number of tricks can be done on the line, and because the sport is fairly new, there is plenty of room for new tricks. Some of the basic tricks done today are walking, walking backwards, turns, drop knee, running and jumping onto the slackline to start walking, and bounce walking. Some intermediate tricks include: Buddha sit, sitting down, lying down, cross-legged knee drop, surfing forward, surfing sideways, and jump turns, or "180s." Some of the advanced tricks are: jumps, tree plants, jumping from line-to-line, 360s, butt bounces, and chest bounces. With advancements in webbing technology & tensioning systems, the limits for what can be done on a slackline are being pushed constantly.

Dean Potter and Andy Lewis opined that high lining is slack lining at elevation above the ground or water. Many slackliners consider highlining to be the pinnacle of the sport. Highlines are commonly set up in locations that have been used or are still used for Tyrolean traverse. When rigging highlines, experienced slackers take measures to ensure that solid, redundant and equalized anchors are used to secure the line into position.
Modern highline rigging typically entails a mainline of webbing, backup webbing, and either climbing rope or amsteel rope for redundancy. However, many highlines are rigged with a mainline and backup only, especially if the highline is low tension or rigged with high quality webbing like Spider Silk. It is also common to pad all areas of the rigging which might come in contact with abrasive surfaces. To ensure safety, most high liners wear a climbing harness or swami belt with a leash attached to the slackline itself. Leashless, or "free-solo".

Slackline yoga takes traditional yoga poses and moves them to the slackline. It has been described as "distilling the art of yogic concentration". To balance on a 1-inch (2.5 cm) piece of webbing lightly tensioned between two trees is not easy and doing yoga poses on it is even more challenging. The practice simultaneously develops focus, dynamic balance, power, breath, core integration, flexibility, and confidence. Using standing postures, sitting postures, arm balances, kneeling postures, inversions and unique vinyasa, a skilled slackline yogi is able to create a flowing yoga practice without ever falling from the line (Alte, 2008).

According to Vultures Freestyle slacklining is the art and practice of cultivating balance on a piece of rope or webbing draped slack between two anchor points, typically about 15 to 30 feet (455 to 915 cm) apart and 2 to 3 feet (60 to 90 cm) off the ground in the center. This type of very "slack" slackline provides a wide array of opportunities for both swinging and static maneuvers. A freestyle slackline has no tension in it, while both traditional slacklines and tightropes are tensioned. This slackness in the rope or webbing allows it to swing at large amplitudes and adds a different dynamic. This form of
slacklining first came into popularity in 1999, through a group of students from Colby College in Waterville, Maine.

Windlining is a practice of slacklining performed in very windy conditions. Depending on the intensity of the wind, it can be difficult to remain on the line without being blown off. The sensation one experiences is like flying as the slacker must angle his body and arms in an aerodynamic manner to maintain the balance.

1.4. Rationale behind selecting the problem

Battle rope develops a grip, muscular and cardiovascular endurance and increase once power output through exercises. Slack lining can improve once balance, posture and concentration. Once core strength will improve and one may feel more focussed and flexible. As very little research has been conducted on the influences of Battle rope and Slackline training on volleyball performance, the investigator can be motivated to take up the study.

1.5. Purpose of the study

The purpose of the study was to find out the impact of Battle rope training and Slackline training on selected physical, physiological and performance variables among male volleyball players.

1.6. Objective of the Study

1. To determine the impact of Battle rope training on selected physical, physiological and performance of Volleyball players.

2. To determine the impact of Slackline training on selected physical, physiological and performance of Volleyball players.
3. To compare the training effects between the experimental groups and the control group by the level of enhancement on selected variables.

1.7. Research Questions

1. Could the Battle rope training programme improve the selected dependent variables while the presence of covariate (pre test)?

2. Could the Slackline training improve the selected dependent variables while the presence of covariate (pre test)?

3. Could the Battle rope training and Slackline training differ with each other and also with control group while improving the selected dependent variables?

1.8. Assumptions

Validity of this study relies on the following assumptions:

1. It was assumed that the participants performed the Battle rope training and Slackline training protocol correctly.

2. Participants was performed the assigned training sessions separately each group, for three days per week.

3. It was assumed that the participants did not perform any vigorous exercises otherwise mentioned during the course of study.

4. It was assumed that the participants were tested accurately by standardized test items.

5. It was assumed that the participants complied with the best of their ability to the training and testing directions.
1.9. Hypotheses

It has been scientifically accepted that any systematic training over a continuous period of time would lead to improvement in performance. Based on this concept and research questions the following research hypotheses were formulated and it was tested at 0.05 level of confidence.

1. There would be significant improvement on selected physical, physiological and performance variables due to the effect of Battle rope training and Slackline training among male Volleyball players.

2. There would be significant differences on selected physical, physiological and performance variables due to effect of Battle rope training and Slackline training among male Volleyball player.

1.10. Limitations

The following were the limitations of this study.

1. The background of the previous training and skills of the volleyball was not considered.

2. Certain factors like food habits, life style, climatic condition, economic status and other environmental factors were not controlled which might influence the performance and these factors were considered as limitation in the study.

3. No special motivation was given to the subjects during testing and training.

4. Self-reported abstinence of any type of exercise-training not prescribed as part of group dependent training.
1.11. Delimitations

1. Thirty six male volleyball players were randomly selected from various colleges in and around Erode, Tamil Nadu state, India. The age of subjects ranged from 18 to 25 years.

2. The subjects have past performance experience of at least three years in volleyball and only those who represented their relevant college teams were taken as subjects.

3. The selected subjects were divided into three equal groups in which each group consisted of twelve subjects named as Battle rope training, Slackline training and control group.

4. Physical variables namely grip strength, explosive strength, leg strength, explosive power, balance, flexibility; physiological variables namely resting heart rate, breath holding time, peak expiratory flow rate, vital capacity, forced vital capacity, slow vital capacity and performance variables.

5. Only pre and post tests were taken. The following standardized tests were used to measure the grip strength assessed by grip dynamometer, explosive strength assessed by vertical jump test, leg strength assessed by dynamometer, explosive power assessed by overhead medicine ball throw, balance assessed by stork balance stand Test, flexibility assessed by sit and reach flexibility Test, resting heart rate assessed by digital heart rate/blood pressure monitor, breath holding time assessed by digital stop watch, peak expiratory flow rate assessed by peak flow meter, vital capacity, forced vital capacity, slow vital capacity assessed by spiro meter and the volleyball playing ability assessed by using subjective rating.
1.12. Significance of the Study

The result of the study can be useful to the professional colleagues of physical education and sports in strengthening their knowledge about the battle rope training and Slackline training and its effect.

1. This study would help to do more researches in this area.

2. The information gained from this study would allow researchers, trainers, physical education professionals, strength and conditioning coaches, and personal trainers to better prescribe exercise to their players, athletes and clients.

3. The findings of the study would add to the quantum of knowledge in sports training.

4. A unique aspect of this work is that it includes recommendations for the practical use of research findings.

1.13. Definition of the Terms

Training

Training is a pedagogical process, based on scientific principles, aiming at preparing sportsmen for higher performance in sports competitions (Singh, 1991)

Physical fitness

The ability to function efficiently and effectively without injury, to enjoy leisure, to be healthy, to resist disease, and to cope with emergency situations (Physical fitness, 2014).

Strength

Strength is the ability to overcome resistance or to act against resistance (Singh, 1991).
Grip strength

The measurable ability to exert pressure with the hand, fingers, or both. It is measured by having a patient forcefully squeeze, grip, or pinch dynamometers; results are expressed in either pounds or kilograms of pressure (Elsevier, 2009).

Explosive strength

Explosive strength as the ability to release maximum force in the fastest possible time. It is the ability of body or segment of it to apply force at rapid rate (Mathew, 1973).

Explosive Power

Explosive power is the ability of the muscle or a group of muscles to release maximum force in the shortest possible, in an explosive manner, projecting the body or an object (Clarke and Clarke, 1987).

Balance

Balance is the ability to stay upright or stay in control of body movement, and coordination is the ability to move two or more body parts under control, smoothly and efficiently (Robert Wood, 2010).

Flexibility

It is defined as the range of possible movement about a joint or sequence of joints. (Clarke, 1972).

Resting heart rate

This is a person's heart rate at rest. The best time to find out once resting heart rate is in the morning, after a good night's sleep, and before one get out of bed in the morning. (Johnson, 2010).
**Breath holding time**

The duration of time through which one can hold his or her breath without inhaling or exhaling” breath holding time has been defined as an individual’s ability to hold the breath, a voluntary forced maximal inhalation without exhalation during the period of holding the breath. Breath holding time is the times consumed to keep or without taking the breathing action as much as possible. (Robson, 1972).

**Peak expiratory flow rate**

Peak expiratory flow rate is the maximal flow achieved during the maximally forced expiration initiated at full inspiration, measured in litres per minute (Wilmore and Costill, 2004).

**Vital capacity**

Vital capacity is the amount of air expelled from the lungs after a deep inspiration. (Wilmore and Costill, 2004).

**Forced vital capacity**

Forced vital capacity (FVC) is the volume of air that can forcibly be blown out after full inspiration, measured in liters. (Wilmore and Costill, 2004).

**Slow vital capacity**

Slow vital capacity (SVC) is the maximum volume of air that can be exhaled slowly after slow maximum inhalation. (Wilmore and Costill, 2004).
Performance


Performance in an athletic context has a popular connotation of representing the pursuit of excellence, where an athlete measures his or her performance as a progression toward excellence or achievement (*Thomson Gale, 2007*).