**SYNOPSIS**

**(RANDOMIZE CLINICAL TRIAL)**



**Name of Student: H.M. ABU BAKAR AZHAR**

**Registration Number:**

**Riphah College of Rehabilitation & Allied Health**

**Sciences**

**Faculty of Rehabilitation & Allied Health Sciences**

**RIPHAH INTERNATIONAL UNIVERSITY ISLAMABAD**

**Effects of high resistance sprint training versus resisted plyometrics on speed, agility and balance in cricket fast bowlers.**



**Name of Student: H.M.ABU BAKAR AZHAR**

**Name of Co-Supervisor: Dr. HALIMA SHOUKAT**

**In Partial Fulfilment of Requirements For the Award of Degree of**

**Masters of Science in Physical Therapy**

**(Sports)**

**Riphah College of Rehabilitation Sciences& Allied Health Sciences**

**Lahore Campus**

**RIPHAH INTERNATIONAL UNIVERSITY ISLAMABAD**

**RIPHAH INTERNATIONAL UNIVERSITY**

**ACADEMIC PROGRESS REPORT**

**For the period *from* spring 2022*to fall* 2023.**

1. **Personal Information of Scholar:**

|  |  |
| --- | --- |
| Name: | H.M.Abu Bakar Azhar |
| Registration No.: |  |
| Program: | MSPT-S |
| Faculty/Department: | Physical Therapy |
| Email: |  |

1. **Academic Progress:**

|  |  |
| --- | --- |
| Admission Date: | 2022 |
| Status of Coursework (Credit hours completed and remaining): |  |
| Expected Date of Completion of Research Work: | September 2023. |
| Expected Date of Completion of Program: | September 2023. |
| Last GPA and CGPA (Please attach result of each semester): | 3.00 last semester GPA and 3.15 CGPA. |

1. **Research Topic:**

|  |  |
| --- | --- |
| Topic of Research: | Effects of high resistance sprint training versus resisted plyometrics on speed, agility and balance in cricket fast bowlers. |
| Date of Approval | November 7, 2022. |
| Name of Supervisor |  |
| Name of Co-Supervisor (if any): | Dr. Halima shoukat |
| Status of Research Work |  |

1. **Employment Status:**

|  |  |
| --- | --- |
| Unemployed |  |
| Employed (job place, title, and status—i.e., on study leave or otherwise) | Physiotherapist at Al-Mustafa welfare trust. |

*Please Note: The scholars under HEC Indigenous 5000 Fellowship Program shall not undertake any employment whether paid or otherwise at any stage during their course of study of the program.*

Dated: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Signature of Scholar: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Remarks of the Supervisor:**

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1. **Overall progress: (please tick only one)**

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| --- | --- | --- | --- | --- |
| **Poor** | **Satisfactory** | **Good** | **Very Good** | **Excellent** |
|  |  |  |  |  |

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| --- | --- |
| **Verified/Certified by** | **Countersigned by** |
| **Supervisor** | **HOD Physical Therapy** |
| Name: | Name:  Dr. Muhammad Salman Bashir |
| Signature: | Signature: |
| Date: | Date: |

**SIGNATURES**

**Title:**Effects of high resistance sprint training versus resisted plyometrics on speed, agility and balance in cricket fast bowlers

**Name of Student:** H.M.Abu Bakar Azhar

**Registration No:**

1. Dr. Halima Shoukat (Supervisor) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Dr. ------------------------- (Internal) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# TITLE

Effects of high resistance sprint training versus resisted plyometrics on speed, agility and balance in cricket fast bowlers.

# 2. Project Summary

Cricket is a bat-and-ball sport in which two teams of eleven players compete against one another on a field with a 22-yard pitch in the middle and wickets at either end made up of two bails balanced on three stumps. One of the two primary methods of bowling in the game of cricket is fast bowling, commonly known as speed bowling. The other method is spin bowling. Pace bowlers are also referred to as fast bowlers, quicks, or pacemen. To reflect the main aspect of their deliveries, they can also be called a seam bowler, a swing bowler, or a fast bowler who can swing it. Sprint training is doing an activity at a certain percentage of all-out effort in order to increase heart rate. Ideally, sprint training workouts should be done three times a week. Allow at least one to two days of rest or another easy exercise between sprint workouts. Plyometrics is a type of exercise training that uses speed and force of different movements to build muscle power. Plyometrics training can improve your physical performance and ability to do different activities.

It will be a randomized clinical trial aimed to find the comparative effects of high resistance sprint training versus resisted plyometrics on speed, agility and balance in cricket fast bowlers. Cricketers who meet the inclusion criteria will be recruited from Wahdat Road cricket ground and Indoor cricket Johar town. Two groups will be formed 16 patients will be allocated in each group. Before applying the techniques pre and post reading will be taken while high resistant splint training (sled, parachute and weight beld) will be applied to group A while resisted plyometric(squat jump, reverse lunge knee ups, box jumps) will be applied to the patients of group B. Two sessions per week will be given for 4 weeks. Tools used during our study are 1. 30m Sprint. 2. T Agility test 3. Illionus Agility runs. 4. Star excursion test. The aim of this study is to find an exercise regimen that is more effective in improving speed, agility and balance in cricket fast bowlers so that it can be in cooperated in daily practice of cricketers and can have better performance outcomes. After that post treatment reading will be taken on 4th week. Data will be analyzed by using SPSS for windows version 25.

**Key words**: sprint training, plyometrics, speed, agility, balance,

**3. INTRODUCTION:**

Cricket is distinctly positioned in the world of elite sports because three different formats now exist, each with characteristically different workload requirements. Fast bowlers have greater match-play workload requirements and are at greater injury risk than other positions.(McNamara DJ, Gabbett TJ, Naughton G. Assessment of workload and its effects on performance and injury in elite cricket fast bowlers. Sports medicine. 2017 Mar; 47(3):503-15.)

Sprinting performance has captivated audiences across the world since the ancient Olympic Games in the eighth Century BC. Numerous studies have been conducted using sprinters as a population. There are concerns that resistance training will result in muscle hypertrophy, increasing athlete mass thus impacting on speed. Ross and Leveritt have shown an increase (5–10%) in type I and type II fiber cross-sectional area, in sprinters after prolonged training ranging from 8 weeks to 8 months, which accounts for top-level sprinters' muscular physiques.(1)

Resisted sled sprint (RSS) training may provide an effective tool for the improvement of sprint acceleration and maximal velocity. However, the volume and intensity for effective RSS training in different populations is unclear. (2)There are a number of different training modalities that can be used to improve sprint performance. Strength and conditioning coaches must select the most appropriate modalities for their athletes, taking into consideration the sprint distances that typically occur during competition.(3)

Sprinting is key in the development and final results of competitions in a range of sport disciplines, both individual (e.g., athletics) and team sports. Resisted sled training (RST) might provide an effective training method to improve sprinting, in both the acceleration and the maximum-velocity phases.(4).

Plyometric training (PT) is a technique used to increase strength and explosiveness. It consists of physical exercises in which muscles exert maximum force at short intervals to increase dynamic performances. In such a training, muscles undergo a rapid elongation followed by an immediate shortening (stretch-shortening contraction), utilizing the elastic energy stored during the stretching phase. There is consensus on the fact that when used, PT contributes to improvement in vertical jump performance, acceleration, leg strength, muscular power, increase of joint awareness and overall sport‑specific skills.(5)

The purpose of plyometric training is to increase the power of subsequent movements using both natural elastic components of muscle and tendon and the stretch reflex. Various sports may benefit from plyometric training.Some benefits of plyometric training are increased neuromuscular function, increased bone mineral density, improved cardiovascular risk profile, facilitated weight control, enhanced psychosocial well-being, and decreased risk for injury in sports(6)

More common structural changes relate to changes in the mechanical characteristics of the muscle-tendon complex and single-fiber mechanics. Increases in single muscle fiber diameters of 10% in type IIa, 11% in type I, and 15% in hybrid type IIa/x fibers have been reported . The most commonly examined area of structural change from PT involves analysis of the plantar flexor tendon responses such as stiffness, transmission of force. (7)

Agility is the natural evolution of flexibility. Until the 1990s, the term “flexibility” was used to refer to agility, but, because of market changes, competitiveness and the need for speed, the term “agility” was coined. While flexibility is considered as an operational ability, agility is a strategic ability that enables a firm to establish a strategic long-term vision. In fact, flexibility is an agility capability, among other capabilities such as responsiveness or speed(8) .Speed is used in sports for such muscle reaction that are characterized by maximally quick alteration of contraction and relaxation of muscles. Speed performances can‘t be improved to considerable extent as is in of case strength andendurance.(9)

Dynamic balance represents the ability to perform an action while maintaining or restoring a stable position and plays a crucial role in many sports activities. Lower limb musculoskeletal injuries in sports are linked with balance abnormalities and altered postural control.(10)

**Rationale**:

The aim of this research is to find an exercise regimen that is more effective in improving speed, agility and balance in cricket fast bowlers so that it can be in cooperated in daily practice of cricketers and can have better performance outcomes.

**LITERATURE REVIEW**

In 2016 A Asadi, H Arazi et al show a clear picture about the possible variables of enhancements of change-of-direction (COD) ability using longitudinal plyometric-training (PT) studies and determine specific factors that influence the training effects a study was conducted.For that a computerized search was performed, and 24 articles included in the study.The results showed that participants with good fitness levels obtained greater improvements in COD performance (P < .05), and basketball players gained more benefits of PT than other athletes. Also, men obtained COD results similar to those of women after PT.(11)

Another study was conducted in 2013 by Nicholas H. Gist at el to find the Sprint interval training (SIT) involving repeated 30-s “all out” efforts have resulted in significantly improved skeletal muscle oxidative capacity, maximal oxygen uptake, and endurance performance. Seventeen effects were analyzed from 16 randomized controlled trials of 318 participants. SIT improves aerobic capacity in healthy, young people. Relative to continuous endurance training of moderate intensity, SIT presents an equally effective alternative with a reduced volume of activity.(12)

Another study was conducted in 2015 byDarren J. Paul to evaluate the reliability and validity of agility tests in team sports detail factors that may influence agility performance, and identify the effects of different interventions on agility performance. The review was undertaken in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines. They concluded that agility tests generally offer good reliability, although this may be compromised in younger participants responding to various scenarios.

**Literature Gap:**

There were numerous studies conducted till date related to speed, agility and balance in cricketers and in other sports players. the use of plyometric training in players increases their neuromuscular function, increased bone mineral density, improved cardiovascular risk profile, facilitated weight control, enhanced psychosocial well-being, and decreased risk for injury in sports. effect of resisted sprint training in players. there is little literature about the comparative effects of both these two exercise programs on speed, agility and balance in cricket fast bowlers. This study will compare the effects of these two training on speed, agility and balance on cricket fast bowlers.

## OBJECTIVE

## To compare the effects of high resistance sprint training versus resisted plyometrics on speed,

## agility and balance in cricket fast bowlers.

## 6. HYPOTHESES

**6.1 NULL HYPOTHESIS**

There is no significant difference in effects of high resistance sprint training versus resisted plyometric on speed, agility and balance in cricket fast bowlers.

**6.2 ALTERNATE HYPOTHESIS**

There is a significant difference in effect of high resistance sprint training versus resisted plyometric on speed, agility and balance in cricket fast bowlers.

# Material & methods:

## 7.1 STUDY DESIGN

This will be a Randomized Clinical Trial.

## 7.2 SETTING

This study will be conducted on the cricket fast bowlers playing in Wahdat Colony Cricket ground and Indoor cricket Johar town.

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## DURATION OF THE STUDY

The study will be completed within 9 months after the approval of synopsis.

## SAMPLE SIZE

Sample size is calculated through Epitool software using Star excursion balance variable.Imai A, Kaneoka K, Okubo Y, Shiraki H. Effects of two types of trunk exercises on balance and athletic performance in youth soccer players. International journal of sports physical therapy. 2014 Feb; 9(1):47. Sample size by considering 10% attrition rate is 32.

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| --- | --- |
| Mean 1 | 76.73 |
| Variance 1 | 4.8 |
| Mean 2 | 74.38 |
| Variance 2 | 4.65 |
| Confidence level | 0.95 |
| Power | 0.8 |
| Ratio of sample sizes | (N2/n1) 1 |
| Tails | 2 |

Results:

|  |  |
| --- | --- |
| Sample size 1(n1) | 14 |
| Sample size 2(n2) | 14 |
| Total sample size(both groups) | 28 |

## STUDY GROUPS

Resisted sprint training (sled, parachute and weight beld) will be applied to players of group A

**Group B**:

Resisted plyometric training (squat jump, reverse lunge knee ups, box jumps) will be applied .Zghal F, Colson SS, Blain G, Behm DG, Granacher U, Chaouachi A. Combined resistance and plyometric training is more effective than plyometric training alone for improving physical fitness of pubertal soccer players. Frontiers in physiology. 2019 Aug 7; 10:1026.

## SAMPLING TECHNIQUE

Non-probability convenience sampling technique will be used.

## SAMPLE SELECTION

### INCLUSION CRITERIA

* Male cricket fast bowlers.
* volunteered to participate in the study.(13)
* Cricket fast bowlers of age 25 to 40 years.
* Those Fast bowlers, bowling from more than one year.

### EXCLUSION CRITERIA

### The exclusion criteria will be players with any orthopedic limitation.(14)

* Female cricket players will be excluded from the study.
* Players involved in any other sport.
* Those fast bowlers having Neurological isssues.

## DATA COLLECTION TOOL

**30 m sprint test:**

The flying 30-meter sprint test is a popular test used by everyone from beginners to world-class athletes to evaluate speed. While there is distance involved, the flying 30m sprint test is of overall sprinting speed and not distance.There is little to no equipment needed to conduct the flying 30-meter sprint. All that is required is markers and a stopwatch. An assistant is optional, although an assistant will help to provide more accurate results.Meyers RW, Oliver JL, Hughes MG, Cronin JB, Lloyd RS. Maximal sprint speed in boys of increasing maturity. Pediatric exercise science. 2015 Feb 1; 27(1):85-94.

**T agility:**

The Agility T-test is commonly used to assess the ability of team sport athletes to change direction, including acceleration, deceleration, and lateral movement during preseason testing protocols.To perform the agility T-Test the athlete or participant is to run forward from a starting point to 10 meters to point on and then sidestep to point two before sidestepping to point three. From point three, side stepping to point one then running back to finish line. The process is then repeated side stepping in the other direction first(15).

**Illionus agility Run Test:**

The Illinois agility test is a fitness test designed to test one's sport agility. It is a simple test which is easy to administer and requires little equipment. It tests the subject's ability to turn in different directions and quickly change speed. Hachana Y, Chaabène H, Nabli MA, Attia A, Moualhi J, Farhat N, Elloumi M. Test-retest reliability, criterion-related validity, and minimal detectable change of the Illinois agility test in male team sport athletes. The Journal of Strength & Conditioning Research. 2013 Oct 1; 27(10):2752-9.

**Star Excursion Balance Test:**

The Star Excursion Balance Test is a reliable measure and a valid dynamic test to predict risk of lower extremity injury, to identify dynamic balance deficits in patients with lower extremity conditions, and to be responsive to training programs in healthy participants and those with lower extremity conditions. (Coughlan GF, Fullam K, Delahunt E, Gissane C, Caulfield BM. A comparison between performance on selected directions of the star excursion balance test and the Y balance test. Journal of athletic training. 2012 Jul; 47(4):366-71.

**DATA COLLECTION PROCEDURE:**

Prior to the study, all participants will be informed of the purpose and method of conducting the research. Each of them will sign an informed consent release to participate in the project and to process personal data for scientific purpose. This is to confirm that all research will be performed in accordance with relevant guidelines and regulations.

**Treatment protocol to Group A:**

It consists of players on which high resistance sprint training will be applied for 20 minutes and the technique will be applied for 2 times per week.

**Treatment protocol to Group B:**

It consists of players on which resisted plyometrics will be applied for 20 minutes for two times a week.

All participants in both groups will be evaluated before and after the training programs.

## DATA ANALYSIS PROCEDURE:

The data will be analyzed using SPSS for Windows software, version 25. Statistical significance will be set at P = 0.05. Normality of data will be checked through Shapiro’s Wilk test. Following tests will be used:

 **Descriptive Statistics**: Frequency tables, pie charts, bar charts will be used to show summary of group measurements measured over time.

**Change within Time:**Difference between pre-training and post-training readings will be calculated using Paired sample t-test for parametric data. For nonparametric data Wilcoxon signed rank test will be used. This a non-parametric test that compares paired groups.

**Difference between Groups:** Independent sample t test will be used. This nonparametric test that is used to compare two population at different variousintervals. It obtained data is non-parametic then Mann Whitney U test will be used.

**CONSORT 2010 Flow Diagram**

## Follow-Up

Analysed (n= )  
 Excluded from analysis (give reasons) (n= )

Analysed (n= )  
 Excluded from analysis (give reasons) (n= )

Lost to follow-up (give reasons) (n= )

Discontinued intervention (give reasons) (n=)

Lost to follow-up (give reasons) (n= )

Discontinued intervention (give reasons) (n= )

## Enrollment

Allocated to intervention (n= 16 )

 Received allocated intervention (n= )

 Did not receive allocated intervention (give reasons) (n= )

Allocated to intervention (n=16 )

 Received allocated intervention (n= )

 Did not receive allocated intervention (give reasons) (n= )

Randomized (n= 32)

Excluded (n= )

  Not meeting inclusion criteria (n= )

  Declined to participate (n= )

  Other reasons (n= )

Assessedforeligibility (n= )

## Analysis

1. **nalysis**

## Allocation

**10. References**

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14.Fischetti F, Vilardi A, Cataldi S, Greco G. Effects of plyometric training program on speed and explosive strength of lower limbs in young athletes. Journal of Physical Education & Sport. 2018 Dec 1;18(4).

15.Slimani M, Chamari K, Miarka B, Vecchio FBD, Chéour F. Effects of Plyometric Training on Physical Fitness in Team Sport Athletes: A Systematic Review. Journal of Human Kinetics. 2016;53(1):231-47

**ENGLISH CONSENT FORM**

The study you are about to participate is a randomized control trial survey titled as;

“**Effects of high resistance sprint training versus resisted plyometrics on speed, agility and balance in cricket fast bowlers”**

The study has no potential harm to participants. All data collected from you will be coded in order to protect your identity, and should not be disclosed to anyone. Following the study there will be no way to connect your name with your data. Your answers to the questions will not affect the quality of education given to you. Any additional information about the study results will be provided to you at its conclusion, upon your request.

You are free to withdraw from the study at any time. You agree to participate, indicating that you have read and understood the nature of the study, and that all your inquiries concerning the activities have been answered to your satisfaction.

NAME ………………. SIGNATURE ………………

DATE ……………….

### URDU CONSENT FORM

میں \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ تصدیق کرتا/ کرتی ہوں کہ

محترمحافظ محمد ابو بکر اظہر

نے

**اپنی تحقیق**

**(Effects of high resistance sprint training versus resisted plyometrics on speed, agility and balance in cricket fast bowlers)**

زیرنگرانی محترمہ ڈاکٹر حلیمہ شوکت

، کے متعلق بتا دیا ہے۔ مجھے اس تحقیق کی نوعیت، مقاصد، احداف، توقعات، فوائد اور خطرات کے متعلق ساری معلومات فراہم کر دی گئی ہیں۔

اس تحقیق کے دوران ساری معلومات صیغۃ راز میں رہیں گی اور مریض کا نام اور دیگر معلومات صرف تحقیق کے لیے استعمال ہوں گی۔مجھے یہ بھی بتا دیا گیا ہے کہ میں اس تحقیق سے متعلقہ ہر قسم کے سوال پوچھنے کا مجاز ہوں اور یہ تحقیق صرف ایک شخص ک مفاد میں نہیں ہے بلکہ بحسثیت مجموعی انسانیت کا مفاد اس سے وابسطہ ہے۔ تمام تفصیلات جاننے کے بعد یس تحقیق میں شامل ہونے یا نہ ہونے پر کسی کا قائل نہیں ہوں۔ اس تحقیق سے کسی بھی وقت علیحدہ ہونے پر مجھ پر کوئی پابندی نہیں ہو گی۔ میں بذاتِ خود بقائمی حوش و حواس اور رضا مندی سے اس تحقیقاتی عمل میں شامل ہوتی/ ہوتا ہوں۔

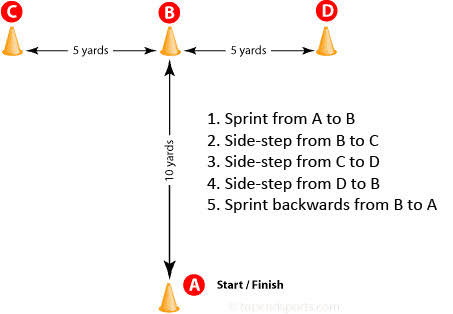
دستخط محقق -------------------------

دستخط شرکت کار -----------------------

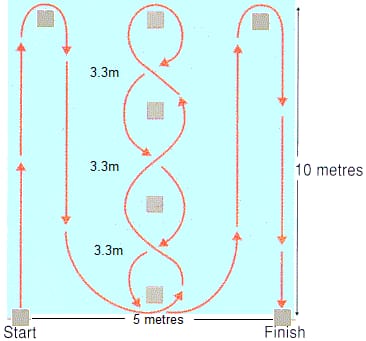
تاریخ ------------

1. **QUESTIONAIRE/TOOL:**

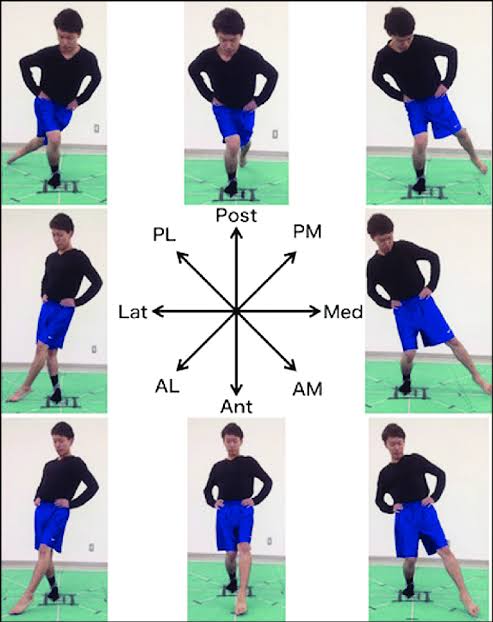
**T Agility teat:**

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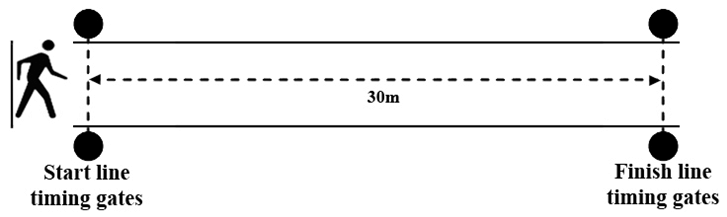
**Illionus agility Run:**

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**Star excursion test**



**30 m sprint:**

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|  |  |  |
| --- | --- | --- |
| Measures | Pre training readings | Post training readings after 4 weeks |
| **30 m sprint** |  |  |
| **T agility** |  |  |
| **Illionus agility Run** |  |  |
| **Star excursion test** |  |  |