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Efficacy of Agility Training in a Police Cadet: A Case Study

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

Background: Plyometric training is a blend of training for strength and stamina. This enables muscles to exert full strength in short time intervals, with the intention of increasing power (speed-strength) in order to ensure stronger police cadet agility. Preparation for physical health, Preparation for Technical Event, Tactics Preparation and psychological preparation these are four important components for the Sports which makes athletes more-strong and achieve high success. Agility is characterized by sudden change in the direction by maintaining the ability in which quickly changing the direction of the body.
Objective: Analyse the result of the 12-week Plyometric Agility Program in Police Cadets. **Diagnosis, Therapeutic Intervention and Outcomes:** The cadet was examined for any deformity and any problems regarding the lower limb soft tissue and Range of motion, Manual muscle testing and agility test were carried out. 40 Cadets aged above 18 years were grouped into two. Analysis was then carried out with assessment of T-test Agility test, Illinois Agility Test, Edgren Side Step Test. Intervention duration is 12-weeks, completed successfully. Assessment was done on 1st day of visit then at the end of 6th week and again at the end of 12th week. Cadet would have to perform 4 session of Plyometric Training per week. Plyometric Training is best to increase the agility which

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was evident in this case.
Conclusion: Plyometric training is very beneficial to increase the Agility of the lower limb as the time period required to complete the Agility test were more and now the time period is less. It comes under the "Good" Grades. Hence, it is proved that Plyometric Training is more helpful to increase the agility.

Keywords: Plyometric training; Agility, Agility Test; T-test Agility test; Illinois Agility Test; Edgren Side Step Test.

1. INTRODUCTION

It is important that in any sports athletes must have more efforts to achieve the High Achievement. Physical condition is the one of the parts of it to achieve the great success. Preparation for physical health, Preparation for Technical Event, Tactics Preparation and psychological preparation these are four important components for the Sports which makes athletes more-strong and achieve high success. Functional Potential of athletes is increase by Physical Preparation and help to growth for Motoric ability of Bio which caused increase velocity component of the athletes. Frequent descents may affect the performance of the sport and Lead to increasing injuries incidence. Focused on the concept of Plyometric may lead to stability of the knees through changes in landing strategies. [1] Plyometrics is a kind of training to ensure fast, powerful movements and improve the nervous system's functions, in general to improve sport performance. Plyometrics are conditioning methods used to improve intensity and explosivity for athletes in all forms of sports. The lower limb plyometric exercises mix pace and power for explosives. These exercises include the period of slightly eccentric and shortening muscle contractions that typically use the body as a ten overload. [2] Agility is the capability to hold or monitor location of the physique by moving rapidly in a variety of movements. [3] The potential to begin explosively, reduce, shift direction and speed up anew while retaining control of body and decreasing velocity can be generally determined by agility. The complexity of agility depends on several factors: nervous system, human anthropometric properties, muscle coordination, consistency of the muscle and the gesture characteristics. Agility is highly affected by body and motor control; for quick movements to be accomplished, athletes need to learn high degrees of particular techniques to ensure optimum performance even in challenging situations of stability, transition and imbalance without substantial deceleration.[4]

2. CASE PRESENTATION

A 26 years old male with right hand dominance came to Physiotherapy OPD on dated 22nd October 2020 for the purpose to increase the Agility for the Sports which will be on dated 14th January 2021. Following the next day physiotherapy rehabilitation was started.

An informed consent was taken from the patient prior. He was examined in supine position; Standing Position and no deformity was observed. On inspection, No Presence of scar mark present over lower limb and no marked oedema present on knee joint and on foot. Local temperature was normal. And no Tenderness was present. All reflexes and sensation were intact. There was no limb length discrepancy. The outcomes assessed are presented in table 1, 2, and 3.

Timeline

Timeline Event	Date
Visit Physio OPD	22nd October 2020
Physiotherapy for Agility Begin	23rd October 2020
Agility Test Measure	6th week from 22nd October 2020
Agility Test Measure	12th week from 22nd October 2020
Sport Event	14th January 2020

3. INITIAL EXAMINATION FINDINGS

Table 1. Range of motion assessment on 1st day of physiotherapy treatment

Joint	Right		Left	
	Actively	Passively	Actively	Passively
Flexion of Hip	0-110	0-116	0-111	0-117
Extension of Hip	0-15	0-18	0-15	0-17
Abduction	0-40	0-47	0-40	0-46
Adduction	0-26	0-29	0-26	0-29
Knee Flexion	0-135	0-135	0-135	0-135
Extension	135-0	135-0	135-0	135-0
Flexion(BSS)	130	135	130	135
Extension(BSS)	130-0	135-0	130-0	135-0
Ankle Planter Flexion	0-50	0-50	0-50	0-50
Dorsiflexion	0-10	0-10	0-10	0-10

Table 2. Manual Muscle Testing (strength) assessment on 1st day of physiotherapy treatment

		Left	Right
Hip	Abductor	04/5	04/5
	Adductor	04/5	04/5
	Flexors	04/5	04/5
	Extensors	04/5	04/5
	Internal Rotators	04/5	04/5
	External Rotators	04/5	04/5
Knee	Extensors	04/5	04/5
	Flexors	04/5	04/5
Ankle	Plantar Flexors	04/5	04/5
	Dorsi Flexors	04/5	04/5

Table 3. Agility Outcomes assessment on 1st day of physiotherapy treatment

Agility Test	1	2	3
T-test	18 sec	17 sec	19 sec
Illinois Agility test	20 sec	19 sec	20 sec
Edgren Side Step test	0	0	0

4. INTERVENTION

During the time period of training, participant will be told not to alter their current physical activities. The participant will receive plyometric training for 12 week which consists of range of plyometric exercise made for the lower limb. The plyometric exercise is Squat jump, Reverse lunge knee-ups, Box jumps, Stairway hops, Tuck jump, Lateral bounds. The Plyometric training program consists of 4 training programs in a week. The training depends on intensity, sets, and replays. (Image 1, 2, and 3)

4.1 Phase 1

Phase 1 consist from First day of rehab up to 4 weeks. It consists of basic training program for the Police Cadet. Squat Jump Exercise will be given for the 3-4 days per week. There must be 3 sets for 10 replays is given. Reverse Lunge Knee-Ups exercise training for three sets and 30 seconds for each lower limb for 3-4 days per week.

4.2 Phase 2

Phase 2 starts from fifth week to eighth week. Moderate exercise is given with few other exercises. Box Jumps are started with three sets and twelve replays. This exercise must be carrying with previous exercise. Three – Four days per week exercise should be done. Along with Box Jumps, Stairways hops are started with 3 sets and replays must be ten times.

4.3 Phase 3

Phase 3 is the last phase of the training program. Its starts from 9th week and end up at 12th week. During this phase Tuck Jumps program is given for 3 sets and repetitions are 10 times. Along with this, Lateral Bound program is started with 5 sets with 8 times repetitions. All the sets and replays must be progressively increase after every week of exercise by moderately or according to cadet's efficiency.

5. FOLLOW UP AND OUTCOMES

All the outcomes were reassessed and are presented in Table 4, 5, 6, and 7

Image. 1. Starting Position Jump

Image. 2. Cadet slight above the ground

Image. 3. Cadet above the ground and decelerate

Table 4. Range of motion assessment on 12th week of physiotherapy treatment

Joint	Right		Left	
	Actively	Passively	Actively	Passively
Flexion of Hip	0-112	0-117	0-111	0-117
Extension of Hip	0-16	0-19	0-15	0-17
Abduction	0-42	0-48	0-40	0-46
Adduction	0-27	0-30	0-26	0-29
Knee Flexion	0-135	0-135	0-135	0-135
Extension	135-0	135-0	135-0	135-0
Flexion(BSS)	130	135	130	135
Extension(BSS)	130-0	135-0	130-0	135-0
Ankle Planter Flexion	0-50	0-50	0-50	0-50
Dorsiflexion	0-10	0-10	0-10	0-10

Table 5. Manual Muscle Testing (strength) assessment on 12th week of physiotherapy treatment

		Left	Right
Hip	Abductor	05/5	5/5
	Adductor	05/5	5/5
	Flexors	05/5	5/5
	Extensors	05/5	5/5
	Internal Rotators	05/5	5/5
	External Rotators	05/5	5/5
Knee	Extensors	05/5	5/5
	Flexors	05/5	5/5
Ankle	Plantar Flexors	05/5	5/5
	Dorsi Flexors	05/5	5/5

Table 6. Agility Outcomes assessment on 6th week of physiotherapy treatment

Agility Test	1	2	3
T-test	10 sec	10.8 sec	11 sec
Illinois Agility test	16 sec	16.2 sec	17.1 sec
Edgren Side Step test	0	1	0

Table 7. Agility Outcomes assessment on 12th week of physiotherapy treatment

Agility Test	1	2	3
T-test	9 sec	9.8 sec	8.5 sec
Illinois Agility test	15 sec	15.2 sec	14.5 sec
Edgren Side Step test	1	1	1

6. DISCUSSION

This will be, to our knowledge, the first research to assess the impact of training of plyometric on the agility factor for the Indian population of police cadets. This is critical as good reporting about how agility training can influence the particular outcomes of agility. The process of involving endurance training in these cadets' daily strength training programs will also shift the emphasis of only strength training on their routes. Michael G. Miller et.al determined that the 6-week plyometric training course affects agility and concluded that it has a motivating impact and benefits in increasing athletes' agility [5] Kevin Thomas and the team determined outcomes in young soccer players of 2-plyometric conditioning technique over muscle strength and outcomes decide that both Counter Movement Jump and Depth Jump Plyometric Training are useful in training exercises to improve strength and agility among young soccer players. [6] While plyometric training has been shown to improve performance variables, i.e.,

agility training goals for visual orientation, maintaining a good place, there is still no empirical evidence to assess if plyometric training actually improves agility. The practice Pace, Agility and Quickness of Rahul Kumar and Dhapola suggests significantly affect the physical fitness variables of velocity, agility, response time, force and versatility cricketers [1] Eight-week water and ground plyometric training for young men's basketball players was practiced at Arazi & Asadi as they noted a greater improvement than water than the land plyometric training and dynamic balance plyometric community preparation [7] Rahimi & Behpur claimed that plyometric training with conventional power lifting supports a positive vertical jump and explosive power output [8] Related studies on different trainings [9,10] musculoskeletal injuries [11] and evidences from Global burden of disease studies [12,13] were reviewed [14-17]

7. CONCLUSION

Plyometric Training represent high positive impact on the agility of the police cadet after 12 week of physiotherapy protocol. Following 12 week of rehabilitation there was significant advancement in muscle strength, range of motion, balance and Agility is increase as the time period for the completion of the T-test, Illinois Test and Edgren Step test was decrease as compared to the 1st day of Physiotherapy. The above case report concluded the Plyometric Training is very beneficial to increase the Agility of the Police cadet which led to improve the physical performance and become more energetic.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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