The influence of specific training on the plyometric profile

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Introduction

- Sprinting, jumping and change of direction involve the stretch-shorten cycle (SSC) and therefore plyometric training is used to improve these factors.
- The jumping strategy utilized during specific exercises has a significant influence of the biomechanical parameters (Bobbert, 1990 ; Jidovtseff et al. 2014). As a consequence, it is very important to know exactly what should be developed, in regards with sport characteristics and athlete needs. Indeed, in some cases, it is important to jump as high as possible while in other cases it is important to reduce the ground contact time.
- According to the principle of specificity, it is expected that the choice of plyometric exercise has to be matched to the desired biomechanical adaptation (Bobbert, 1990 ; Young et al, 1999).
- The aim of the present study was to investigated the influence different plyometric programs on jumping ability development in recreational athletes.

Methods

Population

Training groups	Countact time (CT)	Countact time + jump height (CT-JH)	jump height (JH)	jump height + Strength training (JH-S)	Control (CON)
Subjects (N)	9	11	10	9	8
Age (years)	19 (1,2)	23,7 (2,2)	21,7 (2,8)	23 (0,9)	23,1 (0,8)
Height (cm)	176,8 (8)	179,9 (8,5)	178,3 (7)	178,9 (4,7)	179,4 (4,8)
Weight (Kg)	67,9 (9,5)	76,64 (12,6)	73,7 (6)	76,72 (6,5)	77,31 (6,7)

Protocol

Pretest = Plyometric profile → 8 weeks training period: CT, CT-JH, JH, JH-S groups → Post test = Plyometric profile

« PLYOMETRIC PROFILE TEST »

CONTINUUM

Device : Myotest Pro (accelerometer)

Measurements : Jump height (JH) Countact Time (CT) Reactivity Index (RI = aérial time/CT)

CJ-CT	CJ-CTR	CJ-R	CJ-RJH	CJ-JH
6 continuous jumps + Shortest ground contact time + Low jump height	6 continuous jumps + Shortest ground contact time + Moderate jump height	6 continuous jumps + Shortest ground contact time + Jump as high as possible	6 continuous jumps + Moderate ground contact time + Jump as high as possible	6 continuous jumps + Long ground contact time + Jump as high as possible

2 trials /modality

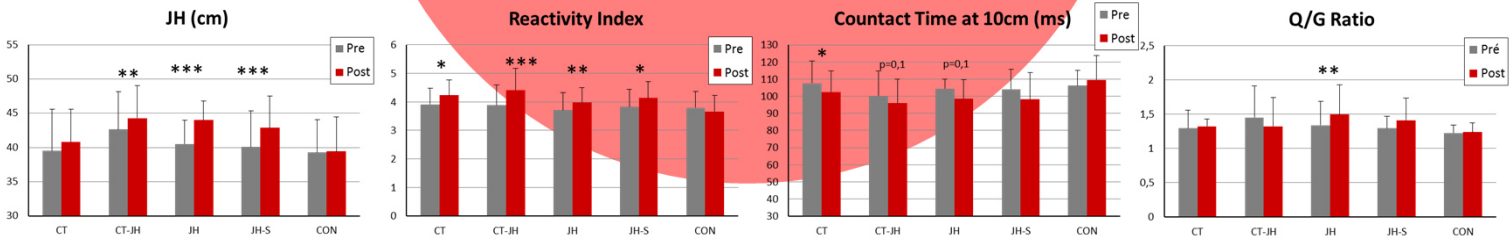
Q/G Ratio Ratio between the maximal JH (with the use of quadriceps implicated in the knee flexion) and the extended leg JH (with the use of gastrocnemius)

Training programs (2x/week)

	CT		CT-JH		JH		JH-S		
	Exercises	Reps	Exercises	Reps	Exercises	Reps	Exercises	Reps	Number of jumps
Week 1	High frequency short countact Time jumps Extended legs jumps Countact time jumps	2 X 5sec 2 X 6 2 X 8	Extended legs jumps CMJ Jump over hurdles (30cm) with extended legs	2 X 8 2 X 8 2 X 8	CMJ Continuous jumps Jump over hurdles (50cm) with knee flexion	2 X 8 2 X 8 4 X 4	Extended legs jumps Continuous jumps + 10kg Leg Press + 80kg	2 X 8 2 X 8 2 X 8	48/5 96/w
Week 2	High frequency short countact Time jumps Extended legs jumps Countact time jumps	3 X 5sec 1 X 8 + 2 X 6 1 X 8 + 2 X 6	Extended legs jumps CMJ Jump over hurdles (50cm) with knee flexion	1 X 8 + 2 X 6 1 X 8 + 2 X 6 1 X 8 + 2 X 6	CMJ Continuous jumps Jump over hurdles (50cm) with knee flexion	1 X 8 + 2 X 6 1 X 8 + 2 X 6 1 X 8 + 2 X 6	Extended legs jumps Continuous jumps + 10kg Leg Press + 100kg	1 X 8 + 2 X 6 1 X 8 + 2 X 6 1 X 8 + 2 X 6	60/5 120/W
Week 3	Extended legs jumps Countact time jumps Jump from bench to bench with extended legs	3 X 8 3 X 8 3 X 8	Extended legs jumps CMJ Jump over hurdles (50cm) with extended legs	3 X 8 3 X 8 3 X 8	CMJ Continuous jumps Jump over hurdles (50cm) with knee flexion	3 X 8 3 X 8 3 X 8	Extended legs jumps Continuous jumps + 20kg Leg Press + 120kg	3 X 8 3 X 8 3 X 8	72/5 144/w
Week 4	Extended legs jumps Countact time jumps Jump from bench to bench with extended legs Continuous jumps with extended legs + 4kg	2 X 8 2 X 8 2 X 8 2 X 8	Extended legs jumps Jump over hurdles (50cm) with knee flexion Countact time jumps Continuous jumps + 4kg	2 X 8 2 X 8 2 X 8 2 X 8	CMJ Continuous jumps Jump over hurdles (50cm) with knee flexion Continuous jumps + 4kg	2 X 8 2 X 8 2 X 8 2 X 8	Extended legs jumps Continuous jumps + 20kg 2x4 hurdles jumps (50cm) Leg Press + 120kg	2 X 8 2 X 8 2 X 8 2 X 8	64/5 128/W
Week 5	Extended legs jumps Countact time jumps Jump from bench to bench with extended legs Continuous jumps with extended legs + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Countact time jumps Jump over hurdles (50cm) with knee flexion Drop Jumps with extended legs (30cm) Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	CMJ Continuous jumps Jump over hurdles (50cm) with knee flexion Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Extended legs jumps Continuous jumps + 25kg 2x4 hurdles jumps (50cm) Leg Press + 120kg	3 X 6 3 X 6 3 X 6 3 X 6	72/5 144/w
Week 6	Extended legs jumps Countact time jumps Jump from bench to bench with extended legs Continuous jumps with extended legs + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Countact time jumps Jump over hurdles (30cm) with extended legs Drop Jumps with knee flexion (30cm) Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	CMJ Drop Jump (30cm) Jump over hurdles (50cm) with knee flexion Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Extended legs jumps Continuous jumps + 25kg 2x4 hurdles jumps (50cm) Leg Press + 120kg	3 X 6 3 X 6 3 X 6 3 X 6	72/5 144/w
Week 7	Extended legs jumps Countact time jumps Jump from bench to bench with extended legs Continuous jumps with extended legs + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Countact time jumps Jump over hurdles (50cm) with knee flexion Drop Jumps with extended legs (40cm) Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	CMJ Drop Jump (40cm) Jump over hurdles (50cm) with knee flexion Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Extended legs jumps Continuous jumps + 30kg 2x4 hurdles jumps (50cm) Leg Press + 140kg	3 X 6 3 X 6 3 X 6 3 X 6	72/5 144/w
Week 8	Extended legs jumps Countact time jumps Jump from bench to bench with extended legs Continuous jumps with extended legs + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Countact time jumps Jump over hurdles (30cm) with extended legs Drop Jumps with knee flexion (40cm) Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	CMJ Drop Jump (40cm) Jump over hurdles (50cm) with knee flexion Continuous jumps + 4kg	3 X 6 3 X 6 3 X 6 3 X 6	Extended legs jumps Continuous jumps + 30kg 2x4 hurdles jumps (50cm) Leg Press + 140kg	3 X 6 3 X 6 3 X 6 3 X 6	72/5 144/w

Results

- The results demonstrated that JH and JH-S programs were more effective for improving jump height performance (+7 to 9%; $p<0.005$) compared to insignificant jump height changes in the CT and CON groups. CT-JH was the most effective on the reactivity index (+14%, $p<0.005$) although significant increases (+8%, $p<0.05$) were also observed in CT, JH and JH-S groups. CT was the only group to significantly decrease short contact time (-5%, $p<0.05$). ANOVA analysis revealed significant groups*session effect for jump height ($p<0.01$) and reactivity ($p<0.005$) but not for short contact time.



Discussion & conclusion

- Researches that have focused on the specificity of plyometric training presented contradictory results. While most studies demonstrated that changes in performance were specific to the plyometric training (Bobert, 1990 ; Young et al, 1999,) a few were not able to confirm such specific adaptation (Thomas et al. 2009).
- By comparing the effect of four different and progressive plyometric programs, the present study revealed that in recreational athletes different plyometric programs could lead to different adaptations and change in performance. Only CT training was able to reduce CT while the most significant improvement in RI were observed in the CT-JH group as expected. JH and JH-S training protocols were the more effective to increase JH.
- The overall results confirms the specificity of the plyometric training. The choice of exercises carried out during training and the instructions given should be adapted to the specific qualities that athletes have to develop.

References

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