Case Study: The Effects of Suspension Training on Measures of Lower Limb Strength and Stability

Jason L. Reeves, AOS & Allyn Byars Ph.D., CSCS,*D

Introduction

Suspension Training (ST) can be traced back over 150 years ago when it was first used in physical education classes to promote bodyweight in multi-directional movements as a form of exercise. Since then, ST has evolved into a valued tool used to design specific training programs geared towards better weight lifting techniques, core and limb stability, and strength gains throughout an entire range of motion. Obtaining the ability to control the leverage of bodyweight is easily and safely achieved allowing execution of beginner to advanced multi-directional movements.

Purpose of Study

With the steady gain in popularity amongst trainers and fitness enthusiasts, greater knowledge of ST use and the techniques associated with its use needs to be addressed. The purpose of this study is to measure the possible changes suspension training will have on lower limb strength and stability on a 21-year old detrained female

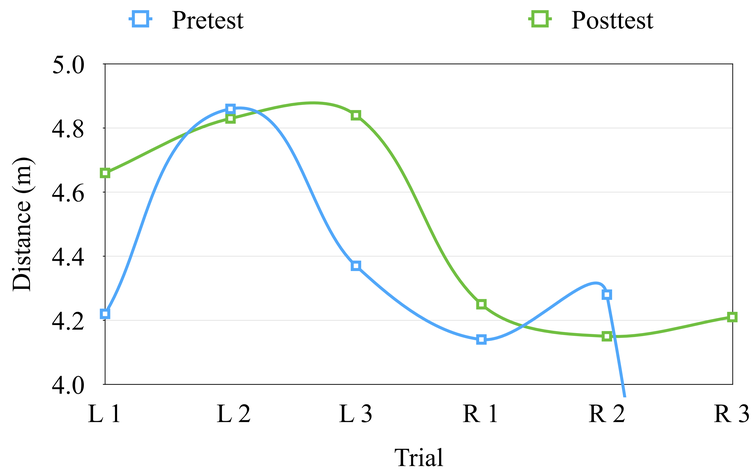
Methods

Field tests consisting of a single-leg squat and triple-hop limb symmetry test, along with a drop jump test with force plate measurements will be done pre- and post- a six week prescribed training program. These tests will quantitatively and qualitatively show the pre- and post-physical condition the participant is in, and what changes have or have not taken place during the six week training cycle. The participant will be briefed on the nature and procedures of the study at an initial meeting. If desired to participate, the participant will complete an informed consent form and a pre-participation medical history screening questionnaire developed by the American Heart Association (AHA) and the American College of Sports Medicine (ACSM). ACSM pre-participation health screening and risk stratification guidelines will be strictly applied. Initiation of the study will begin upon approval from the Institutional Review Board for Human Participants at Angelo State University.

Table 1: Comparison of Pretest and Posttest Single Leg Squat Test

Pretest	Right Leg			Left Leg		
	Pelvic Drop	**Knee Valgus**	**Trunk Lean**	**Pelvic Drop**	**Knee Valgus**	**Trunk Lean**
Trial 1	Neutral	Moderte	Neutral	Neutral	Slight	Neutral
Trial 2	Lt High	Moderate	Rt Lean	Rt High	None	Forward
Trial 3	Neutral	Slight	Forward	Neutral	Moderate	Forward
Posttest	**Right Leg**			**Left Leg**		
	Pelvic Drop	**Knee Valgus**	**Trunk Lean**	**Pelvic Drop**	**Knee Valgus**	**Trunk Lean**
Trial 1	Neutral	None	Forward	Lt High	Slight	Forward
Trial 2	Neutral	None	Forward	Neutral	None	Neutral
Trial 3	Neutral	Slight	Forward	Neutral	None	Forward

Chart 1: Comparison of Pretest and Posttest for Triple Hop Limb Symmetry Test



Discussion/Conclusion

It was found with the use of ST, the participant showed gains in stability, range of motion, and strength in this six week trial. Through the field tests of the single leg squat test and the triple hop limb symmetry test one can determine the likelihood of future problems with knee and hip deficiencies in strength and motion. Pretest showed elevated risks for knee injury through the participant's pelvic drop, knee valgus, trunk lean, and controlled landing ability. Posttests showed a decrease risk of knee injury through these factors. Posttest results for the drop jump with a force plate measurement, the first and second landing showed a decrease in the Fx and Fy vectors, and an increase in the Fz vector. This numerically shows the participant had more concentrated force in the vertical direction, and less force being applied left/right and front/back directions. This study points to reasons why it is beneficial to included suspension training in personal and athletic training sessions for increased lower limb strength and stability. In the future emphasis should be placed on a longitudinal investigation on whether suspension training correlates to these gains, or the addition of weight training provides enough benefit.

Chart 2: Comparison of Pretest and Posttest for Drop Jump Test