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A COMPARISON STUDY IN BODYBUILDERS BY AGE FOR SINGLE TWO LEG JUMP PARAMETERS

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Abstract:
Introduction: The goal of this study was to investigate the difference between three age groups of bodybuilders for jump parameters using single two leg jump test. **Methods:** In this study, three groups of randomly selected subjects were included. 28 participants took part in the study (9 participants 18.5 years SD 2.1; 8 participants 22.7 years SD 2.4; 11 participants 29 years SD 2.9). The participants were regularly bodybuilder that took part in national championship in Albania. Single two leg jump test were used measuring jump parameters. **Results:** The data from the study for comparison between age groups for maximum rate of action do not show significant changes (sig = 0.2), the jump height / min has significant changes (sig = 0.04), the height of the jump did not show significant changes (sig = 0.1), the efficiency of the jump (the power applied to the applied force) does not show significant changes (sig = 0.7), the total of maximum force does not show significant changes (sig = 0.2), the maximum left foot force does not show significant changes (sig = 0.2), the force difference _p_t1_t3 (sig = 0.3), the total of maximum power does not show significant changes (sig = 0.6), the maximum left foot power does not show significant changes (sig = 0.8), the maximum right foot power does not show significant changes (sig = 0.4). **Discussion:** The study results show that the maximum right foot force has significant changes (sig = 0.04), the maximum force difference between left and right legs is significant (sig = 0.03), the maximum relative strength has significant changes (sig = 0.03).

Keywords: jump, strength, bodybuilder

1. Introduction

Several studies have analyzed how long the fatiguing effects of cardiovascular exercise last. In general with both continuous long duration and interval training there are decrements in maximal strength and the ability to perform repetitions at a submaximal load immediately, 4 hours, and 8 hours post exercise (Leveritt & Abernethy 1999; Sporer & Wenger 2003). But these decrements appear to subside by 24 hours. However,

a previous cardiovascular session, though it does not impede performance, still appeared to change the fiber recruitment response for up to 32 hours. In particular, it appears that at least in trained individuals there is greater plasma concentrations of ammonia which is generally thought to increase in formation as a result of a greater reliance on fast twitch fibers, though it may also indicate greater protein degradation. Data from Widrick et al (1993) show that the second window bodybuilders should be weary of is after exercise. Following training protein synthesis rises within the first hour. In untrained individuals, it peaks at 16 hours but can be maintained for up to 72 hours. The goal of this study was to investigate the difference between three age groups of bodybuilders for jump parameters using single two leg jump test.

2. Methods

In this study, three groups of randomly selected subjects were included. 28 participants took part in the study (9 participants 18.5 years SD 2.1; 8 participants 22.7 years SD 2.4; 11 participants 29 years SD 2.9). The participants were regularly bodybuilder that took part in national championship in Albania. Single two leg jump test were used measuring jump parameters, Leonardo mechanography test (Single Two Leg Jump).

2.1 Statistical analysis

All variables evaluated in this study were tested for normality. The ANOVA (one way) test followed by the LSD (post hoc) test was used to compare the difference between the groups. Level $p < 0.05$ (Significant Change) was accepted in this study. All statistical analyzes were performed using SPSS 20.0 software.

3. Results

Table 1 shows data for the age group of 20 years for the average indicators and the standard deviation of the maximum two-leg jump force. For the category of age -20 years; the performance indicators by weight, (average = 100.9) (SD = 13.6), maximum action speed (mean = 2.6) (SD = 0.2), jump height / min (average = 0.2) (SD = 0.04), jump height (mean = 0.5) (SD = 0.06), the efficiency of the jump (the power applied to the applied force) (average = 80.5) (SD = 11.2), total maximum force (mean = 2.5) (SD = 0.4), maximum left foot force (mean = 1.2) (SD = 0.2), maximum right foot force (mean = 1.2) (SD = 0.2), the maximum force difference between left and right legs (mean = 6.4) (SD = 5.9), maximum relative strength (mean = 3) (SD = 0.4), the force difference _p_t1_t3 (mean = 6.6) (SD = 4.1), maximum total power (mean = 4.7) (SD = 0.1), maximum left foot power. (mean = 2.3) (DS = 0.5), maximum right foot power (mean = 2.4) (SD = 0.5), power difference between left-right legs (mean = 6) (SD = 4.7), maximum power per kg (mean = 56.4) (SD = 8.1), the ratio between maximum jump and spin (average = 280.4) (SD = 95.2).

Table 1: Descriptive statistics for test performed on single two leg jump for age -20 yrs

Age_Range		Mean	Std. Deviation
-20 yrs	Single_two_leg_jump_EFI	100.8889	13.58717
	Single_two_leg_jump_V_max	2.6111	.19310
	Single_two_leg_jump_Height_min	-.1767	.04690
	Single_two_leg_jump_Jump_Height	.4622	.06016
	Single_two_leg_jump_Efficensy	80.5556	11.21507
	Single_two_leg_jump_Force_max_total	2.4644	.40050
	Single_two_leg_jump_Force_max_L	1.2367	.21915
	Single_two_leg_jump_Force_max_R	1.2389	.19141
	Single_two_leg_jump_diff_F_max	6.4444	5.87859
	Single_two_leg_jump_Force_max_rel	3.0444	.40057
	Single_two_leg_jump_Force_Diff_p_t1_t3	6.6000	4.15090
	Single_two_leg_jump_Power_max_total	4.7200	.99662
	Single_two_leg_jump_Power_max_L	2.3500	.53068
	Single_two_leg_jump_Power_max_R	2.3811	.47593
	Single_two_leg_jump_Power_diff_P_max	6.0000	4.74368
	Single_two_leg_jump_Power_max_kg	56.7900	8.13498
	Single_two_leg_jump_Power_h_max_h_min	280.4222	95.16862

Table 2 gives data for the age group 20-25 years; performance indicator by weight, (mean = 99) (SD = 16.1), maximum action speed (mean = 2.8) (SD = 0.1), jump height / min (average = 0.3) (SD = 0.09), jump height (mean = 0.5) (SD = 0.04), the efficiency of the jump (the power applied to the applied force) (mean = 82) (SD = 2), total maximum force (mean = 2.3) (SD = 0.3), maximum left foot force (mean = 1.1) (SD = 0.2), maximum right foot force (mean = 1.2) (SD = 0.1), the maximum force difference between left and right legs (mean = 12.7) (SD = 6.9), maximum relative strength (mean = 2.9) (SD = 0.5), the force difference _p_t1_t3 (mean = 6.9) (SD = 1.6), maximum total power (mean = 4.7) (SD = 0.5), maximum left foot power. (mean = 2.3) (SD = 0.3), maximum right foot power (mean = 2.4) (SD = 0.3), the power difference between left and right legs (mean = 8.5) (SD = 5.1), maximum power per kg (mean = 58.3) (SD = 8.9), the ratio between maximum jump and spin (average = 203.1) (SD = 70.6).

Table 2: Descriptive statistics for test performed on single two leg jump for age 20- 25 yrs

Age_Range		Mean	Std. Deviation
20-25 yrs	Single_two_leg_jump_EFI	**99.0000**	**16.09348**
	Single_two_leg_jump_V_max	**2.8167**	**.11060**
	Single_two_leg_jump_Height_min	**-.2600**	**.08718**
	Single_two_leg_jump_Jump_Height	**.4900**	**.03606**
	Single_two_leg_jump_Efficensy	**82.0000**	**2.00000**
	Single_two_leg_jump_Force_max_total	**2.2800**	**.31321**
	Single_two_leg_jump_Force_max_L	**1.0667**	**.17926**
	Single_two_leg_jump_Force_max_R	**1.2167**	**.13317**
	Single_two_leg_jump_diff_F_max	**12.7333**	**6.90604**
	Single_two_leg_jump_Force_max_rel	**2.9067**	**.51033**
	Single_two_leg_jump_Force_Diff_p_t1_t3	**6.9667**	**1.55671**
	Single_two_leg_jump_Power_max_total	**4.6533**	**.55175**
	Single_two_leg_jump_Power_max_L	**2.2600**	**.28844**

	Single_two_leg_jump_Power_max_R	**2.4133**	**.29501**
	Single_two_leg_jump_Power_diff_P_max	**8.5333**	**5.10816**
	Single_two_leg_jump_Power_max_kg	**58.2967**	**8.96663**
	Single_two_leg_jump_Power_h_max_h_min	**203.1333**	**70.60611**

Table 3 gives data for the age category +25 years; performance indicator by weight, (average 84 = 4) (SD = 17), maximum action speed (mean = 2.5) (SD = 0.2), jump height / min (average = 0.2) (SD = 0.04), jump height (mean = 0.4) (SD = 0.05), the efficiency of the jump (the power gained for the applied force) (average = 80) (SD = 11.2), total maximum force (average = 2.1) (SD = 0.3), maximum left foot force (mean = 1.1) (SD = 0.1), maximum right foot force (mean = 0.9) (SD = 0.4), the maximum force difference between left and right legs (mean = 2.4) (SD = 3.2), maximum relative strength (mean = 2.5) (SD = 0.2), the force difference _p_t1_t3 (mean = 4.2) (SD = 2.9), maximum total power (mean = 4.2) (SD = 0.9), maximum left foot power. (mean = 2.2) (SD = 0.4), maximum right foot power (mean = 2) (SD = 0.5), the power difference between left and right legs (mean = 5.1) (SD = 6.1), maximum power per kg (mean = 44.2) (SD = 19.9), the ratio between maximum jump and spin (mean = 175.3) (SD = 50.3).

Table 3: Descriptive statistics for test performed on single two leg jump for age 25+ yrs

Age_Range		**Mean**	**Std. Deviation**
25+ yrs	Single_two_leg_jump_EFI	**84.4286**	**16.99860**
	Single_two_leg_jump_V_max	**2.5300**	**.24685**
	Single_two_leg_jump_Height_min	**-.2371**	**.04608**
	Single_two_leg_jump_Jump_Height	**.4014**	**.05984**
	Single_two_leg_jump_Efficensy	**80.0000**	**11.19524**
	Single_two_leg_jump_Force_max_total	**2.1186**	**.30765**
	Single_two_leg_jump_Force_max_L	**1.0671**	**.14326**
	Single_two_leg_jump_Force_max_R	**.8891**	**.35124**
	Single_two_leg_jump_diff_F_max	**2.3714**	**3.21803**
	Single_two_leg_jump_Force_max_rel	**2.5171**	**.22677**
	Single_two_leg_jump_Force_Diff_p_t1_t3	**4.2286**	**2.18687**
	Single_two_leg_jump_Power_max_total	**4.2443**	**.93357**
	Single_two_leg_jump_Power_max_L	**2.1757**	**.42003**
	Single_two_leg_jump_Power_max_R	**2.0843**	**.50023**
	Single_two_leg_jump_Power_diff_P_max	**5.1429**	**6.10133**
	Single_two_leg_jump_Power_max_kg	**44.2743**	**19.93489**
	Single_two_leg_jump_Power_h_max_h_min	**175.3286**	**50.33242**

Table 4 represents the sigma value of the variables comparison for the three age groups of the parameters measured in the suction test.

Table 4: Comparison data by age category

ANOVA		Sig.
Single_two_leg_jump_EFI	Between Groups	**.119**
	Within Groups	
	Total	
Single_two_leg_jump_V_max	Between Groups	**.167**
	Within Groups	
	Total	
Single_two_leg_jump_Height_min	Between Groups	**.040**
	Within Groups	
	Total	
Single_two_leg_jump_Jump_Height	Between Groups	**.062**
	Within Groups	
	Total	
Single_two_leg_jump_Efficensy	Between Groups	**.963**
	Within Groups	
	Total	
Single_two_leg_jump_Force_max_total	Between Groups	**.189**
	Within Groups	
	Total	
Single_two_leg_jump_Force_max_L	Between Groups	**.181**
	Within Groups	
	Total	
Single_two_leg_jump_Force_max_R	Between Groups	**.041**
	Within Groups	
	Total	
Single_two_leg_jump_diff_F_max	Between Groups	**.033**
	Within Groups	
	Total	
Single_two_leg_jump_Force_max_rel	Between Groups	**.034**
	Within Groups	
	Total	
Single_two_leg_jump_Force_Diff_p_t1_t3	Between Groups	**.309**
	Within Groups	
	Total	
Single_two_leg_jump_Power_max_total	Between Groups	**.589**
	Within Groups	
	Total	
Single_two_leg_jump_Power_max_L	Between Groups	**.762**
	Within Groups	
	Total	
Single_two_leg_jump_Power_max_R	Between Groups	**.408**

4. Discussion

The data from the study for comparison between age groups for maximum rate of action do not show significant changes (sig = 0.2), the jump height / min has significant changes (sig = 0.04), the height of the jump did not show significant changes (sig = 0.1), the efficiency of the jump (the power applied to the applied force) does not show significant changes (sig = 0.7), the total of maximum force does not show significant

changes (sig = 0.2), the maximum left foot force does not show significant changes (sig = 0.2), the maximum right foot force has significant changes (sig = 0.04), the maximum force difference between left and right legs is significant (sig = 0.03), the maximum relative strength has significant changes (sig = 0.03), the force difference _p_t1_t3 (sig = 0.3), the total of maximum power does not show significant changes (sig = 0.6), the maximum left foot power does not show significant changes (sig = 0.8), the maximum right foot power does not show significant changes (sig = 0.4). Bodybuilding is a sport in which competitors are judged on muscular appearance. Natural bodybuilders are drug-tested and are banned from the sport if caught using illegal substances. Appropriate preparation for a natural bodybuilding contest generally involves years of strength training followed by a "contest prep" in which the athlete focuses on dramatically reducing body fat to enhance muscular appearance. Thus, changes seen during competition preparation are not due to sudden dramatic elevations in volume, intensity, or frequency of resistance training but, rather, to a self-induced reduction in energy intake and increase in aerobic activity (Lambert et al., 2004). While other sports may involve short-term (eg, 7–21 d) weight-cutting strategies before competition, bodybuilding is unique in that prolonged (12+ wk) caloric restriction and increases in physical activity with physique-oriented goals are placed above fitness and physical-performance goals. Previous research on bodybuilders has mostly focused on the nutritional and body-compositional changes of the athletes. (Heyward et al., 1989; Walberg-Rankin et al., 1993; Brill & Keane 1994; Steen 1999). A few studies have examined other aspects of contest prep such as hormonal changes (Maestu et al., 2010; Maestu et al., 2008) and strength changes (Bamman et al., 1993). They provide valuable contributions to the bodybuilding literature, but much speculation and misinformation still exists. Most currently published case studies on bodybuilders (excepting the work by Steen focus on the well-known negative effects of anabolic steroid use or oil injections, creating an image of all bodybuilders as diseased, obsessed, steroid-injecting individuals. (Thorsteinsdottir et al., 2006; Koopman et al., 2005; Voelcker et al., 2010; Schafer et al., 2011; Mayr et al., 2012; Banke et al., 2012) . We believe there is more to bodybuilding than these profiles suggest. In addition to the physical changes accompanying bodybuilding preparation, little is known about how such a rigorous regimen may affect mood states. Changes in mood states have been observed after short-term intense exercise training, (Faude et al., 2009) but the effects of long-term bodybuilding preparation on mood states have not been characterized As body mass decreased, absolute VO2peak and critical power decreased as expected while relative values for both remained fairly constant. In contrast, short-term weight cutting (ie, 1 wk) in other athletes may not have such a negative effect on physical performance (Marttinen et al., 2011). After competition, exercise abilities recovered rather slowly. Squat and deadlift strength and critical power recovered by month 4, while bench-press strength and AWC remained below baseline at month 6. This lack of strength and critical power/AWC recovery was reflected in continually depressed vigor as fatigue had returned to baseline by month.

In conclusion of this study results show that the maximum right foot force has significant changes (sig = 0.04), the maximum force difference between left and right legs is significant (sig = 0.03), the maximum relative strength has significant changes (sig = 0.03).

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