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Original article

TESTING KINEMATIC AND ERGOMETER PARAMETERS FOR PERFORMING THE PHASE CONTACT - BEAT – IMPULSE TO THE HIGH JUMP

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Abstract*

Aim. The objectification technique in high jump by biomechanical analysis based on kinematic recording techniques spatiotemporal parameters correlated with parameters of labor - power ergometer, monitored and evaluated with the initial and final tests.

Methods. The subjects included in this research were specialized athletes in high jump event, participants at the National Championships. We used Kistler Quattro Jump force platform and Dartfish ProSuite software in order to achieve the measurement that our research aimed.

Results. F max relative value at the time of contact in the initial testing is 5.7821 w / sec, which falls to 1.91158 w/sec. Power (max DTF) in initial testing is 6.10575 W / sec with a decrease in w 2.86687. DTF max power is in final testing greatly increased by 9.19582 w / sec to 0.08 sec over DTF drops to 8.4858 min w / sec, very small loss in speed due execution confirmed recording time kinematic impulse to 0.200 sec ., which confirms the increase in power after motor training program suited to the jumper.

Conclusions. The height of the jump is in a direct proportion to the improvement of labor - power snapshots / kg and in inverse ratio to the duration of the contact line. The differences between the results expressed by recording parameters in the tests are worth less , due to the characteristics of the muscle - ligament force in developing age-appropriate junior.

Keywords. kinematic parameters, contact - beat - momentum, relative strength, strength - power impulse

Introduction

Techniques were used video with the camera , " Sony HDR- CX360VE " with a scan rate of 200 frames/sec., and physiological research of maximum power under a speed - power on a platform strain gauge (ergometer) , Kistler type 9290BD .

The operational objective of basic research is focused on the objectification technique in high jump by biomechanical analysis based on kinematic recording techniques spatiotemporal parameters correlated with parameters of labor - power ergometer, monitored and evaluated with the initial and final tests (Dapena, 1990).

The research hypothesis

We assumed that the high performance in test height can be improved by operational models since the age junior jumper in accordance with the requirements of the great performances from assessments made based on the analysis of specific kinematic parameters contributing to the optimization technique crossing the bar.

Methods

The subjects included in this research were specialized athletes in high jump event, participants at the National Championships and they were involved in this research as case studies. Teacher observation method.

Experimental methods and case studies that were conducted recording technique platform - ergometer power and cinematic video recording

The comparative method

Results

The battle phase (at the beginning and the end of the beat) as the duration of this phase will be shorter , the greater will be the height of flight CGG , which is explained in this way ensuring a rapid impulses exerted on a road as long.

Practice has delimited two vertical technical procedures, high jump respectively with dorsal rollover option " FLOP - speed " variant " FLOP - force" and this assessment report based on the force /

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weight and speed and power components (Bondoc-Ionescu, 2007).

Features two versions although they are not distinguished the following variants of techniques in the high jump with dorsal reversal:

Table 1. Flop jump procedures

FLOP - speed	FLOP – force
Approximate speed on jump 7,7 – 8,4 m/s	Jump speed 7,0 – 8,0 m/s
Approximate jump length 8-9 steps	10 – 12 steps
Raising up the knees, pronounced in running (sprint position), particularly the last steps, beating runs a foot higher position .	Running position on jump with knees less lift, beating runs from a lower height and leg grazing (Bondoc-Ionescu, 2006).

Observations on recording the ergometer kinematic parameters when contact - beat - momentum

Registration of ergometer kinematics parameters in contact-stroke -momentum by Dartfish software, reveals the duration of contact time and impulse preceding detachment and entry flight path upward (Iagar, 2010). Because preliminary research has found that there is a degree of correlation of force - power parameters optimization technique in high jump, ergometer recordings were performed using Kistler platform. Records values relative contact force - beating, expressed in W/sec (Forces F) recorded in Dartfish program will be analyzed in relation to contact time and force - power impulse values expressed W/sec (dF/dt in Dartfish software) addresses custody and will be analyzed in conjunction with flashing time.

Organizing research was based on kinematic parameters and ergonomic registration of two subjects, Subject 1 type Flop - strength, speed Topic 2 -type flop.

Kinematic parameters were recorded and ergometer , analyzed and compared between initial testing and final testing as follows:

Subject 1

Table 1. Time for performing the pulse and beating phase expressed in milliseconds (initial testing)

Contact time	Pulse time
0	
0.02	
0.04	
0.06	
0.08	
0.1	
0.12	
	0.14
	0.16
	0.18

Table 2. Time fo performing the phase pulse and beating expressed in milliseconds (final testing)

Contact time	Pulse time
0	
0.020	
0.040	
0.060	
0.080	
0.100	

0.120	
	0.140
	0.160
	0.180
	0.200

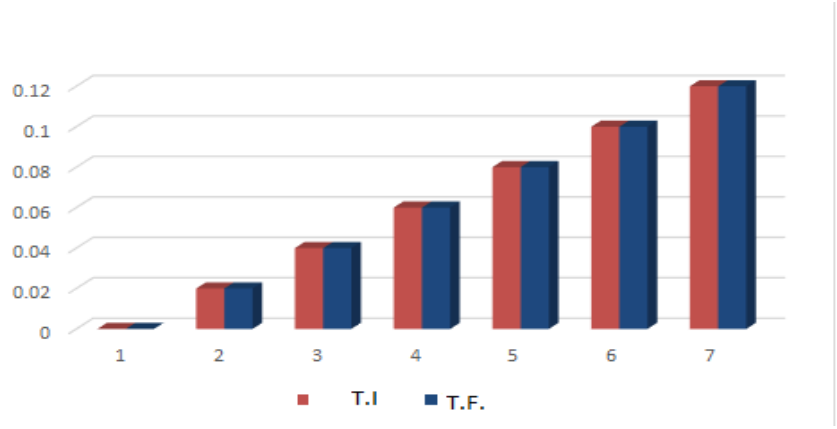

Figure. 1. Comparative chart with the duration of contact in initial testing and final testing

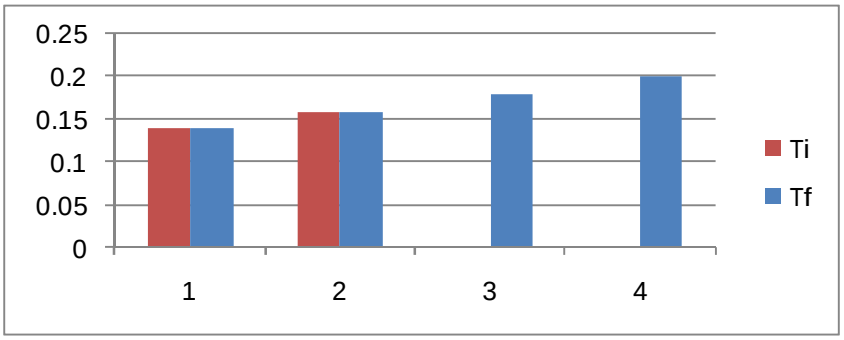

Figure. 2. Comparative chart with the duration of contact in initial testing and final testing

Comparative charts of relative force (forces F) in beat contact and force-power of impulse (Gradient dF/dt).

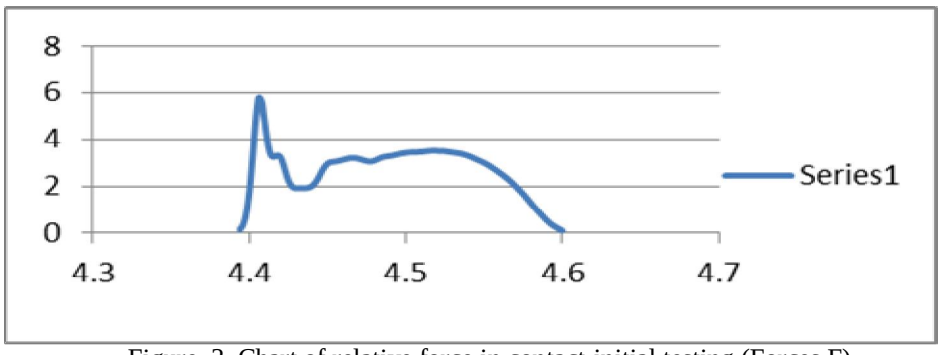

Figure. 3. Chart of relative force in contact-initial testing (Forces F)

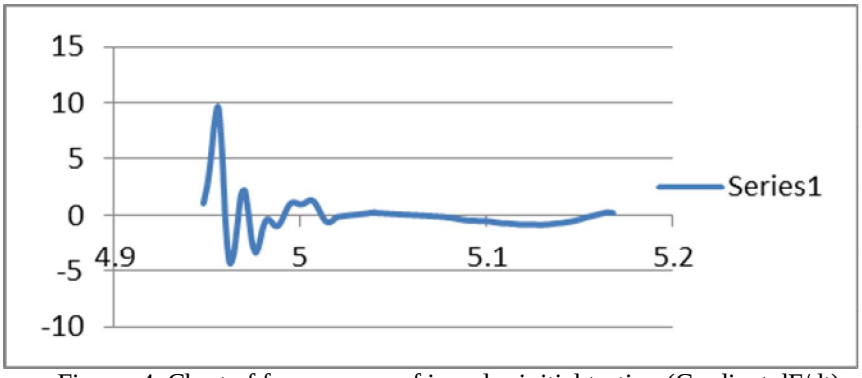

Figure. 4. Chart of force-power of impulse initial testing (Gradient dF/dt)

Motor program of improving force – power was applied (15 June – 18 October 2013).

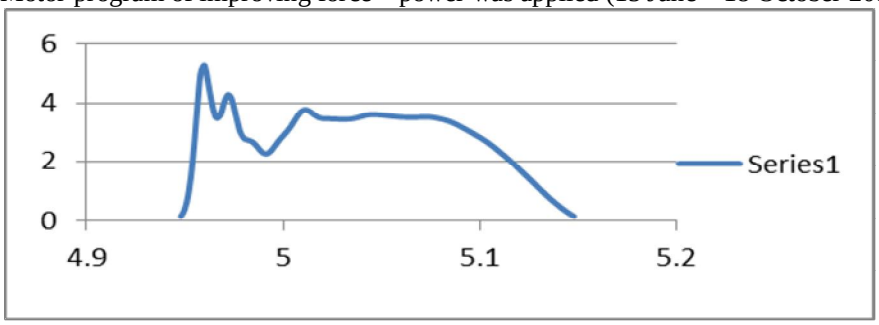

Figure. 5. Chart of relative force in contact-final testing (Forces F)

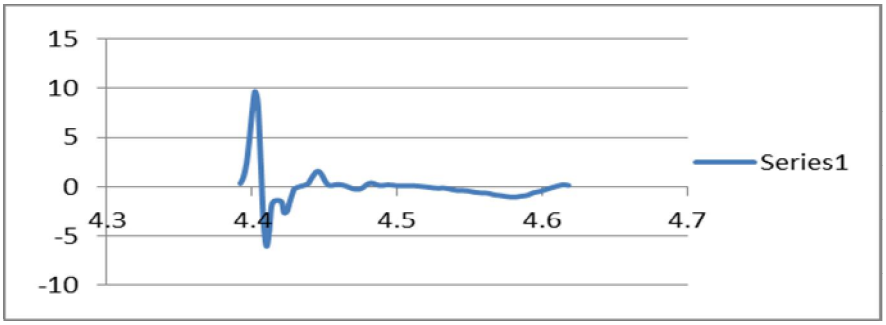

Figure. 6. Chart of force-power of impulse final testing (Gradient dF/dt)

Subject 2

Table 3 – The duration of the beating and impulse phase expressed in milliseconds (initial test)

Contact time	Impulse time
0	
0.020	
0.040	
0.060	
0.080	
	0.100
	0.120
	0.140
	0.160

Table 4 – The duration of the beating and impulse phase expressed in milliseconds (final test)

Contact time	Impulse time
0	
0.020	
0.040	
0.060	
0.080	
	0.100
	0.120
	0.140
	0.160
	0.180
	0.200

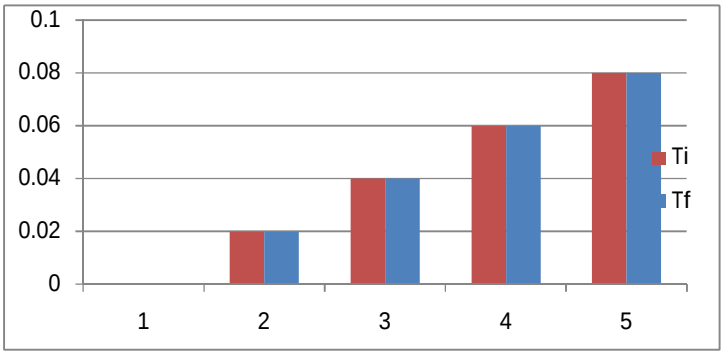

Figure. 7. Comparative chart contact duration in initial testing and final testing

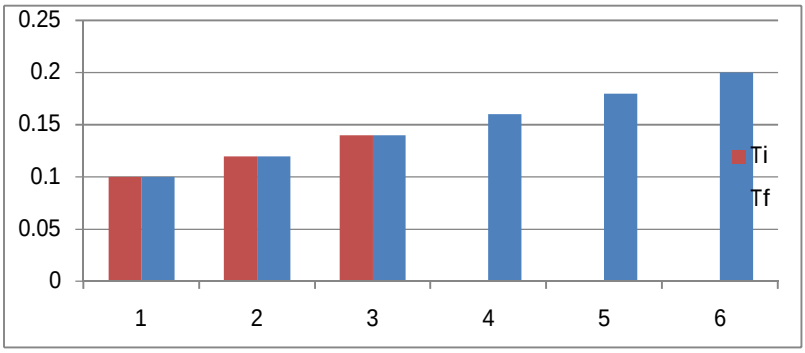

Figure. 8. Comparative chart impulse time in initial testing and final

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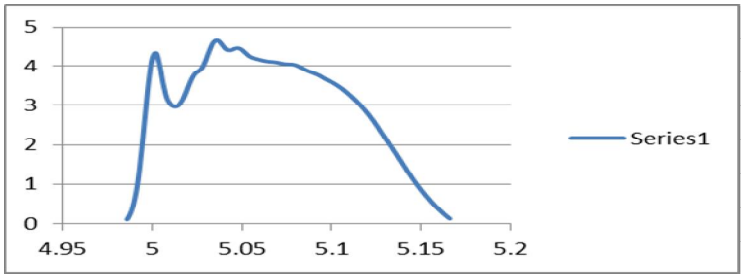

Figure. 9. Relative force in contact beat chart initial testing(Forces F)

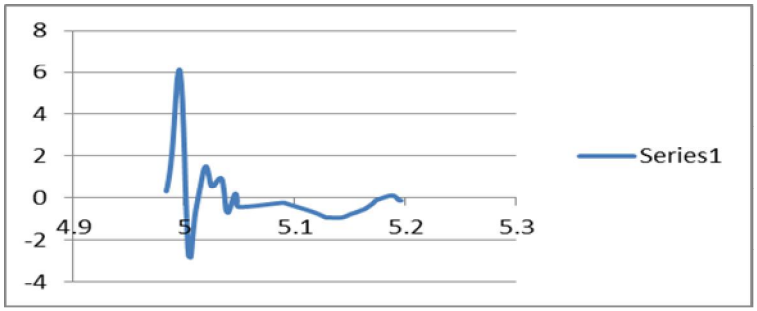

Figure.10. Force impulse power chart (Gradient dF/dt) initial testing

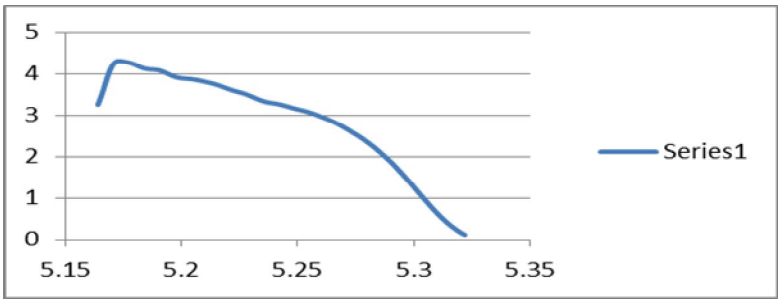

Figure. 11. Force impulse power chart (Forces F) final testing

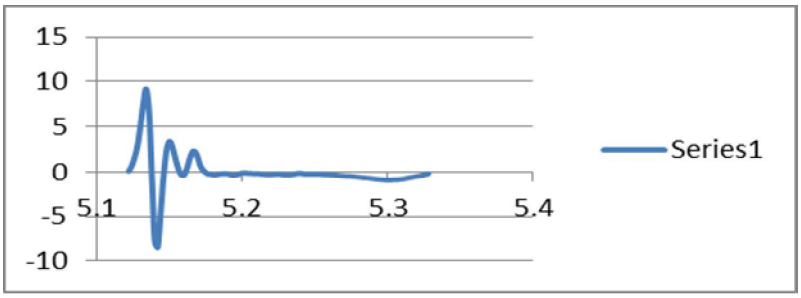

Figure.12. Force impulse power chart (Forces F) final testing

Discussion

This analysis aims to highlight the interaction between the two moments, impulse - detachment, based on specific muscle strength and phase air passing over the bar (Egger, 1992). Motor potential of the jumper in height conversion is based on non-specific general maximum force, the specific force called muscle strength specific jump height optimization technique that can help shift the bar (Dupuis, 2003).

Regarding the first subject, the kinematic parameters registration of the beating contact reveals us that there are identical values of 0.120 ms, both in initial testing (Table 1) and the final testing (Table 2), which shows an automation of this time of the jump . F max relative value at the time of contact in the

initial testing (Figure 4) is 5.7821 w / sec , which over the falls to 1.91158 w 0.24 sec / sec (Figure 5) , the difference is 3, 87,052 , a pretty big loss until the ignition starts to decrease due to the preparation pulses.

In initial testing record (Figure 6) , the power impulse (dF / dt) maximum is 9.57300 w / s, decreasing to 4.26038 w / sec with a loss of over 0,010 5.31262 seconds with a impulsive tempo 0.20 m / sec .

In final testing (Figure 4) , the contact record beating 5.24928 w / sec with a loss of 2.97985 W / sec to the value of 2.26943 W / sec when it starts leaving the seat , positively a stronger impulses . Registration kinematic Pulse duration of 0.14 to 0.200 m / sec , max is DTF 9.70467 w / sec (Figure 4) with a loss of power 3.70874 w / sec to the value of 5.99593 during of 0.008 sec , less loss due to successful implementation of motor training program.

Record cinematic confirms that high power leads to longer impulse time from 0.140 to 0.200 m / sec . (Table 2).

For the second subject, the registration of the beating contact kinematics by comparing graphic (Figure 7) we emphasize that both the initial testing (Table 3) and the final testing (Table 4), the values are equal , so there is an automatic time switch is short of 0,080 m / sec , explained jumper type " flop - speed " . (Table 3 and Table 4)

Flashing time is shorter in initial testing (Table 3) from 0.100 to 0.140 compared with 0.100 to 0.200 times longer impulse m / sec in final testing (Table 4) as a consequence of increased power motor training after the program .

In recording ergometer Kistler platform , it highlights is the correlation between technical execution kinematics and contact forces relative power (max DTF) developed.

In initial testing (Figure 9), beating contact records a maximum force of 4.66819 W/ sec to 0.018 sec decreases over the minimum end bearing force 2.96989 w / sec , with a loss of 1.69830 w / sec.

In final testing (Figure 11), the contact record beat a F max of 4, 30,549 which drops the F min 0.08 sec - 3.01114 w / sec due to energy accumulation in developing static -dynamic impulse power.

Power (max DTF) in initial testing (Figure 10) is 6.10575 W / sec with a decrease in w -2.86687 0.010 sec / sec , huge loss due to deviations in beating plotted , but rapid recovery the final.

DTF max power is in final testing (Figure 12) greatly increased by 9.19582 w / sec to 0.08 sec over DTF drops to 8.4858 min w / sec, very small loss in speed due execution confirmed recording time kinematic impulse to 0.200 sec . (Table 4) , which confirms the increase in power after motor training program suited to the jumper.

Some "problems" encountered during training and competitions related to technical deficiencies due to forces wrongly applied during the execution, especially when -beat -impulse contact can be solved by applying the training of modern technologies represented through appliances and devices that help to analyze and adjust athletes jumping efforts based on physiological reactions (Miller, 2008).

This research has practical importance in the fact that the analysis of recorded parameters can correct errors in the event technique training for high jump.

Conclusions

Implement a program to improve kinesthetic capabilities , which led to the spatio- temporal balance, static - dynamic on stage every moment of contact - beat - momentum.

Recorded and analyzed results lead to the following findings:

The height of the jump is in a direct proportion to the improvement of labor - power snapshots / kg and in inverse ratio to the duration of the contact line. The differences between the results expressed by recording parameters in the tests are worth less , due to the characteristics of the muscle - ligament force in developing age-appropriate junior.

Practical importance in the fact that the analysis of recorded parameters can correct errors in sample preparation technique for height.

Acknowledgments

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