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THE IMPACT OF DETRAINING ON PERFORMANCE AND SOME OF THE BIOMECHANICAL VARIABLES IN TAEKWONDO

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Twenty players (aged 9 – 13 yrs) were divided into two equivalent groups (10 each) based on (age , height , weight , training age and the selected biomechanical variables).The 1st group (fixed training) trained by the round house kick from ready position (stance) while the 2nd group (variant training) trained using different types of the skills' execution. Both group trained there times a week (75 Minutes) for 6 weeks and measurements were taken for the post test, one week later of detraining and two weeks later of detraining, for fixed training and variant training. No significant differences were observed between the two groups in the posttest and first detraining. It is recommended that both training regimen are important to conserve the level of achieved performance after 2 weeks of detraining.

KEY WORDS: fix training, variant training, detraining.

INTRODUCTION: Anyone in the world despite the gender and age variation is able to play Taekwondo without constrain of needing a neither space nor equipment. In Jordan, children are practicing it either in school or in private centers. However, most children quit their practice for one or two weeks due to mid or final semester exams. Therefore, their performance and technique may be negatively affected. Harrison and N. Keane (2007) analyzed the six week intervention effect and a retention test was conducted one week after the post test. Their results indicated that the variable practice group significantly improved their jumping skill compared to pre-test scores but the fixed practice group showed no improvements. Although, the effects of variable and fixed training on the development fundamental skills are not fully understood, the detraining effect needs further investigation. However, most previous studies employed biomechanical analyses on various kicks in Taekwondo were concern to determine kinetics or kinematics and reaction time (Vieten, Scholz , Kilani, & Kohloeffe,2007, Lee & Huang, 2006, Tsai, Lee, & Huang, 2004). Pieter (1995) used a heavy, water-filled bag with built-in pressure sensor to measure both the kicking force and kicking speed of the 1988 United States Olympic Taekwondo teams. Several studies assessed the isokinetic strength of the lower extremity in Taekwondo athletes (Pieter, 1991). Not only was there bio-mechanical research that focused on the kicking technique analysis, there were also some physiological studies that concentrated on the lower extremity characteristics of the Taekwondo athlete. In this study, the impact on censored jacket during Taekwondo kicking was investigated. Moreover, the reaction time of each kick was recorded in order to assess the kicking performance. Nevetheless, studies on detraining effect were conducted on strength and endurance training, none of the analysis ran on the effect of detraining on the technical skill performance of the most kick used called Dollyo Chagi. Zahran, (2004) reported that 44.5% of the Dolly Chagi was executed as Pic Chagi, the kick that is used in this study (the round house kick). Therefore, the purpose of this study was to investigate the effect of detraining for one week and two weeks on the selected biomechanical variables related to round house kick and to compare between fixed and variable detraining effect.

METHODS: Twenty players (aged 9 – 13 yrs) agreed to participate in the study and were divided into two equivalent groups (10 each) based on age , height , weight , training age. The selected biomechanical variables are shown in Table 1.

Table 1
Dimografic data of the 2 groups

Variables	Group	Mean	SD	T value	**P level**
Height (cm)	Fixed	143	8.39	0.74	**0.464**
	Variant	146	10.07		
Weight (kg)	Fixed	38.20	**6.20**	**0.08**	**0.931**
	Variant	38.50	**8.87**		
Age (yrs)	Fixed	10.50	**1.35**	**1.67**	**0.112**
	Variant	11.60	**1.58**		
Training history (weeks)	Fixed	**12.10**	**0.88**	**0.26**	**0.795**
	Variant	**12.00**	**0.82**		

Subjects have executed 3 max trials of round house kick after the six weeks of fixed and variant (different variations of the skill) training programs and they repeated the test after one week and 2 weeks of detraining for each group. Subject stood on the force platform to record the ground reaction forces during the performance of the kicks and was videotaped at 25 images per second from frontal and sagittal planes by Sony digital camera. The video was analyzed using the APAS trimming module. Reflective markers were placed on the hip, and at the kicking foot (ankle). The subjects were asked to start kicking at the onset of the red diode lights and were asked to perform three roundhouses kicking at maximal effort. A light-emitting diode (LED) was placed at the top of the training bag (75kg) that was also placed in front of the subject. When the LED was turned on, the subject commenced kicking. Officials from the Jordan Taekwondo Federation judged their kicks while their kick hitting the training bag hanging at 30cm height and covered with censored Jacket as it is shown in figure 1. When the subject kicked the training bag, the signal from the censored Jacket was transferred to the computer for impact recording.

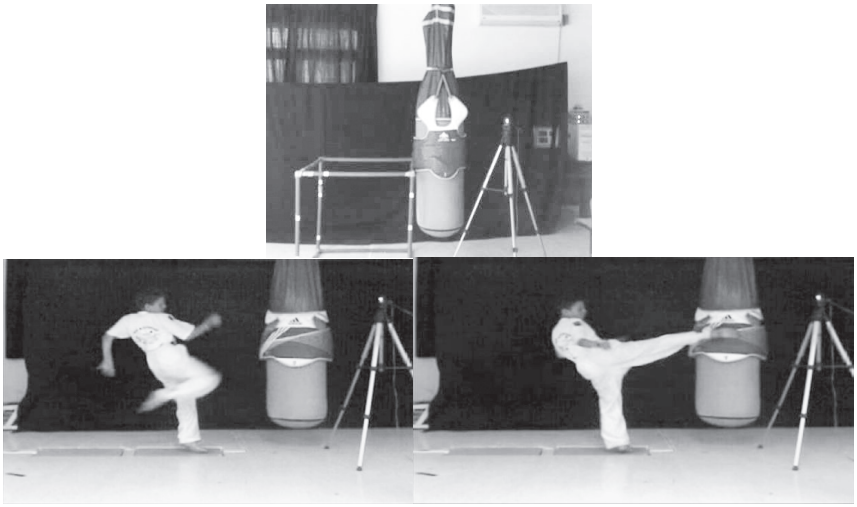

Figure 1: The laboratory setting for data capturing.

Data from the force platform (AMTI) at sampling rate of 1000Hz has been set and the videotapes were synchronized into the APAS software package for further analyses. Data from the APAS were then used for statistical comparison using SPSS version 16. Only 4 biomechanical variables were considered for this paper: the reaction time taken from the onset of a light diode and the initial movement of the foot; initial velocity of the kicking; the force impact at the Censored Jacket; and the z force from the platform.

RESULTS: It has been found that neither training group is better than the other after the completion of the six weeks training sessions in both groups (fixed and variant) as it is displayed in Table 2.
There were no significant differences found at the first post week test between the fixed and variant group post detraining for one week and for the 2 weeks of detraining as it is expressed in Tables 3 and 4.

Table 2
Mean and standard deviations of the fixed and variant groups with t test comparison in the post training sessions

Variables	Group	Mean	SD	T value	P level
Performance on the bag (10)	Fixed Variant	**5.46** **5.32**	**0.66** **0.75**	**0.44**	**0.663**
Max initial velocity of foot kicking (m/s)	Fixed Variant	**5.47** **4.85**	**1.07** **0.63**	**1.57**	**0.132**
Max reaction time (s)	Fixed Variant	**0.3040** **0.3073**	**0.0358** **0.0386**	**0.19**	**0.845**
Max impact (J)	Fixed Variant	**113.40** **111.50**	**9.58** **24.79**	**0.22**	**0.824**
Max force at Z axis (N)	Fixed Variant	**557.05** **553.75**	**117.57** **169.34**	**0.05**	**0.960**

Table 3
Mean and standard deviations of the fixed and variant groups and t test comparison results in the first week of detraining

Variables	Group	Mean	SD	T value	P level
Performance on the bag(10)	Fixed Variant	**5.54** **5.37**	**0.62** **0.81**	**0.52**	**0.604**
Max initial velocity of foot kicking (m/s)	Fixed Variant	**5.85** **5.18**	**0.50** **1.01**	**1.88**	**0.076**
Max reaction time (s)	Fixed Variant	**0.2973** **0.3172**	**0.0422** **0.0223**	**1.31**	**0.204**
Max impact (J)	Fixed Variant	**127.30** **113.60**	**27.19** **30.80**	**1.05**	**0.306**
Max force at Z axis (N)	Fixed Variant	**546.80** **563.20**	**159.74** **160.64**	**0.22**	**0.822**

DISCUSSION: In the literature review on the biomechanical study of kicking, force and speed of kicking were significant parameters in assessing the kicking performance. The roundhouse kick was the fastest kicking technique (Pieter, 1995). Due to the different combination of basic skills found in Taekwondo kicking, there are many ways to perform the roundhouse kick which was used in the variant group in this study. Traditional approaches to training emphasize the importance of specificity of repetition but more recent approaches emphasize the importance of variability of practice. The retention of the skills as well as hi quality performance have been investigated in this study after 1 and 2 weeks of detraining. It is evident there is no differences were found neither post 1st week nor 2ed week of detraining whether children have practiced fixed or variant training. The selected biomechanical variables were not reduced after detraining for 2 weeks. These results fulfilled the desired brakes needed for midterms and final semester exam.

Table 4
Mean and standard deviations of the fixed and variant groups and t test comparison results in the second week of detraining

Variables	group	Mean	SD	T value	P level
Performance on the bag (10)	Fixed Variant	**6.12** **5.88**	**0.51** **0.84**	**0.56**	**0.577**
Max initial velocity of foot kicking (m/s)	Fixed Variant	**6.21** **5.34**	**0.80** **0.95**	**0.77**	**0.448**
Max reaction time (s)	Fixed Variant	**0.3172** **0.3174**	**0.0417** **0.0473**	**2.20**	**0.040**
Max impact (J)	Fixed Variant	**139.60** **109.80**	**37.66** **20.78**	**0.01**	**0.992**
Max force at Z axis (N)	Fixed Variant	**560.80** **574.35**	**142.14** **159.76**	**2.19**	**0.042**

CONCLUSION: It is suggested that in order to master and conserve the level of performance in taekwondo during the learning and training, both fixed and variant training are help full to keep that level after detraining for 2 weeks. In addition, we could not investigate this effect for longer time of detraining and see of which effect will reduce or increase the performance. We suggest conducting further research to investigate longer period of detraining effect.

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