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EFFECT OF HIGH-INTENSITY INTERVAL TRAINING (HIIT) VERSUSHIGH VOLUME ENDURANCE TRAINING PROGRAM (HVET) TO THE IMPROVEMENT OF VO_2MAX, VJ AND POWER FOR MENS VOLLEYBALL PLAYERS

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Abstract

This research was motivated by the lack of durability, VJ and power possessed by the volleyball players. The purpose of this study was to determine the effect of training (HIIT) and HVET to increase VO2max, VJ, and Power, Using design Randomized Control group pretest-posttest design. The population in this study is a volleyball player STKIP PGRI Jombang numbering 33 men. divided into three groups, 11 people HIIT, 11 HVET and 11 controls, with characteristic age ±19, height±172 cm, weight ± 68kg.

The results of this study can be seen that the pattern of HIIT workout and HVET equally yielded significant results to increase VO2max, VJ & Power. the value of F = 4.581> Ftabel = 1,812. the value of F = 6,133> F table = 1,812, and the value of F = 7.178> Ftabel = 1,812. Power HIIT 23% VO2max of 6.94%, VJ 15.4%. VO2max HVET Power 7.75% 14.11% 6.94% VJ. Power Control VJ 5.17% 5.90% 4.13 VO2max. HIIT is more effective to increase VO2max, VJ & Power

***Keyword** : HIIT, HVET, VO_2Max, VJ, Power*

INTRODUCTION

Special physiological capabilities needed to perform volleyball skills (Kalinski, Norkowski, Kerner & Tkaczuk, 2002). Modern volleyball players become faster, stronger and in have a better physical condition resulted of a year-round training and skills development that make the strength, power and fitness become higher (Scates & Linn, 2003). Volleyball is a sport with a high anaerobic and aerobic demands in the lower body part because of the need of power and the movement of quickly jump and back for 20 minutes in a game (Elahe et.al., 2013; Viltasalo, et al, 1987).

A large proportion of literature that has studied the sport of volleyball has had a strongfocus and emphasis on athlete vertical jump ability and in association to this theiroverall jump height (Gehri et al., 1998; Maffiuletti et al.). Tillman (2004), stating the results of jumps each player in NCAA competitions almost do 22 jumps per game smash and block. German beach volleyball player executed on average 85 jumps, that showed an average team total of 145 jump, Identified that the blocking for 27% of the total jumps within a game of beach volleyball (Giatsis, 2001). the support to use these two tests to identify any physical differences between athletes and genders is strong. Usingground reaction forces as a way to calculate variables such as peak power, maximum rate of force development, relative peak power and jump height has been validated by a variety of studies (Aragon-Vargas et al., 2000)

Recent research shows that the cardiovascular adaptations that occur with HIIT are similar, and in some cases superior, to those that occur with continuous endurance training (Helgerud et al. 2007; Wisløff, Ellingsen & Kemi 2009). Helgerud et al. showed that 4 repetitions of 4-minute runs at 90%–95% of heart rate maximum (HRmax) followed by 3 minutes of active recovery at 70% HRmax performed 3 days/week for 8 weeks resulted in a 10%, Daussin et al. (2008), measured VO2max responses among men and women who participated in an 8-week HIIT program and a continuous cardiovascular training program 6 weeks of interval training with continuous endurance VO2max increases were higher in the HIIT.(Perry et al. 2008; Horowitz and Klein (2000).

Many studies have shown that high-intensity interval training (HIIT) performed with sufficient volume for at least several weeks increases peak oxygen uptake (VO2 peak) and the maximal activities of mitochondrial enzymes in skeletal muscle (Kubukeli et.al., 2002; Laursen & Jenkins, 2002; Ross & Leveritt, 2001).Talanian, et.al. (2007), show the effects of HIIT workout and improve VO2max from 7% to 12%. Burgomaster, et.al. (2008), Weekly time commitment was 67% lower in the SIT than ET (5h vs 27 h) SIT and ET groups. Vo2max increased significantly in response to 5 weeks of HIIT and high volume training (HVT). Kuno (2012), that HIT and CE exercise led to significant improvements in body composition, heart rate and aerobic power. Dupont (2004), Ten weeks of inseason HIIT training 2 sessions/week has been shown to significantly improve maximal aerobic speed and 40 m sprint time. Endurance exercise training. In one of the earliest studies, found a significant increase in Vo_2Max. Gibala et al., (2006) 25 compared the effect of 2 weeks of low volume sprint IT and HVE training group on exercise capacity. Competition performance in a 2000 m time trial increased significantly following HIIT, but there was no improvement in the HVT (Sperlich, 2010)

METHODS

Method Randomized Control Group Pretest-Posttest Design study Participants the physical characteristics of the subjects arelisted Table 1. All participants. This study was conducted over 10 weeks: data analysis using ANOVA using SPSS 17:00.

Variable	HIIT	HVET
Protocol	30 s × 4–6 repeats 4.5 min rest	30–40 min running
Training intensity (workload)	(3 sessions per week)	(3 sessions per week)
Weekly training time commitment	All out 10 min (~1.5 h including rest)	All out 4.5 h

Table 1. All participants

Variable	HIIT n; 11	HVET n; 11	Control n; 11
	Mean±SD	**Mean**±SD	**Mean**±SD
Age	19± 1,75	19 ± 1,7	20± 3,18
Height (kg)	172± 6,32	173 ± 6,32	172 ± 6,32
Weight (cm)	68± 9,56	67 ± 9,56	59 ± 9,56

Table 2. Summary of protocols in studies Adaptation burgomaster et.all 2008

RESULT

ANOVA calculation results through the calculation process using SPSS 17

ANOVA

Comparison_PostTest_Between_Power Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	187614,155	2	93807,077	4,581	,018
Within Groups	614369,122	30	20478,971		
Total	801983,277	32			

ANOVA

Comparison_PostTest_Between_VO2Max_Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10,408	2	5,204	6,133	,006
Within Groups	25,455	30	,848		
Total	35,862	32			

ANOVA

Comparison_PostTest_Between_VJ_Group

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	,066	2	,033	7,178	,003
Within Groups	,139	30	,005		
Total	,205	32			

As seen on the table above, the obtained value of F = 4.581> Ftabel = 1,812. the value of F = 6,133> F table = 1,812, and the value of F = 7.178> Ftabel = 1,812 Thus, H0 is rejected, which means there are differences of the influencetoward three groups on the power increasing in limb muscle between the study groups.

Tabel pesentase peningkatan Power, Vo2max & VJ

RESULT	POWER (%)	$VO2_{max}$(%)	VJ(%)
HIIT	23,00	6,94	15,4
HVET	7,75	6,39	14,11
CONTROL	5,17	4,13	5,90

Kuno (2012), showed that high-intensity training and endurance exercise continuously bring significant improvements in body composition, aerobic power and heart rate to less than 2 hours 30 min training weekly. In addition, high intensity training proved to be more effective in improving maximal oxygen capacity. A potential advantage of HIIT over HVET is the lower total time requirement (Gibala, 2006). In addition, the greater specificityassociated with HIIT may also help to maintain or improve speed and power (Sperlich et, al 2010;Tuimil JL, et a1, 2011). In general, an average improvement of between 5% and 25% can be anticipated for healthy young adults in response to HVET ranging from 2 -25 weeks (Mier, 1997) . HIIT has been shown to induce a number of biochemical changes that have been associated with improvements in Vo2max. Theseinclude an increase in muscle oxidative capacity. aspects of the provision of training programs in order to increase VO2max, Power and VJ on a volleyball player. It can be concluded to increase VO2max in athletes volleyball can be given HIIT training program, HVET

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