50 - EFFECTS OF REDUCING THE VOLUME OF THE INTENSITY OF AEROBIC TRAINING ON RESTING HEART RATE IN YOUNG SWIMMERS.

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INTRODUCTION

The desired benefits to the sport of children and youth include improved health, development of the growth characteristics at optimal levels, the psychological well-being and performance of motor skills in appropriate conditions (HASKEL et al., 1985). With the growing involvement of children and young people in competitive sport, many studies have been done on the same cardiorespiratory response to exercise training (and VACCARO MAHON 1987; ROWLAND, 1985; COSTILL et al., 1991). Young swimmers in this process occurs mainly through training on anaerobic threshold, defined as the swimming speed that can be maintained for a indefinite period of time without exhaustion (DENADAI et al., 1997). Moreover, the cardiovascular adjustments resulting from the process of training on anaerobic threshold are closely related to the enhanced vagal modulation of heart (LEE et al., 2003).

The sports training aims to increase performance, however, there is a fine line between optimal and this decrease due to excessive and prolonged stimulation through the application of intense workloads resulting in a poor physiological recovery. Many of the physiological changes associated with physical training too much, ie, overtraining may be accompanied by cardiorespiratory markers (ARMSTRONG and VANHEEST, 2002, CUNHA et al., 2006). Thus, systematic training programs with little or no control increases the chances of prolonged fatigue and reduced performance due to poor recovery. In contrast, training with adequate rest leads to complete recovery thus generating gains in physical fitness.

The behavior of heart rate has been widely studied in different types and conditions associated with exercise as a marker of fatigue and recovery of the body in Swimming training (MAGLISCHO, 1999). And individuals with good aerobic fitness tend to have resting heart rate (HR Rep.) lower than sedentary individuals, but we can not say that this is a direct consequence of training, as other inherent adaptations to aerobic conditioning can influence the behavior of HR Rep. (ALMEIDA AND ARAÚJO, 2003). Thus, in HR Rep. are commonly used as a reference to a functional condition of the body, influencing bands including the determination of intensity (FRONCHETTI et al., 2006).

Some polls have shown a direct relationship between HR Rep. risk of developing cardiovascular disease, indicated that individuals with lower HR Rep. are less likely to develop heart disease (SECCARECIA & MENOTTI, 1992). As an example, Negrao et al. (1992) demonstrated that exercise training resulted in bradycardia at rest and that the mechanism associated with that response was a decrease in intrinsic heart rate. For Greenland (1999), a low HR Rep. tends to represent a good picture of health, while higher values are apparently related to increased risk of mortality, chronic degenerative diseases and increased basal energy expenditure. Related to swimming, swims in the same absolute intensity of the adaptations to exercise training heart rate has also decreased response tachycardia. Therefore, the objective of this study was to monitor HR Rep. in young swimmers during five days to verify their metabolic recovery.

METHODOLOGY

Study participants were twenty contestants swimmers (12 boys and 8 girls) aged between 13 and 14 years who practiced Swimming at least two years. The swimmers were evaluated during 9 consecutive weeks divided into Week 1 (S1), Week 8 (S8) and Week 9 (S9) where they were measured in their HR Rep. by palpation of the carotid artery. All subjects were familiar with the measurement of heart rate in these conditions and this procedure was adopted for easy application, low cost and good prediction (WILMORE and COSTILL, 1994).

The measurements of S1 and S8 were performed before each training session at the end of each week for one minute in two trials where the average was recorded. S9 in the procedure adopted was the same, but the swimmers onsocial HR Rep. five days during their so-called D1, D2, D3, D4 and D5. The collections are always given the same time of day during the days of the study where swimmers remained seated with the legs together for 5 minutes to stabilize the South FC before the start of counting of heartbeats.

The swimmers performed the training in a systematic way for 90 minutes, 6 times a week during the nine weeks test. We adopted an intensive training program with the predominance of anaerobic metabolism threshold S1 to S8 and weekly volume of 20 km .. The intensity of training during these weeks was in line with that proposed by Maglischo (1999) where the heart rate stood at 65% to 85% of the maximum calculated using the formula suggested by Tanaka (2001). S9 During the training volume was reduced by 40% and the intensity between D1 and D5 was found in 50% to 60%. After exploratory data analysis, we carried out the statistical analysis test for paired samples using SPSS software version 13.0. The level of significance was 5%.

RESULTS

Table 1 shows HR Rep. mean and standard deviation (SD) during the S1, S8 and S9 and across all days of the S9 (D1 to D5) for females (FEM), masculine (MASC) and general (GENERAL). The decrease in HR Rep. male group was higher compared with the general and the female followed the overall group and finally the women. There were no significant differences ($p < 0.05$) decreases in HR Rep. in all groups.

Table 1: HR Rep. Mean and standard deviation (SD) during the S1, S8 and S9 and across all days of the S9 (D1 to D5) of girls, boys and overall.

GRUPOS	S1	S8	S9				
			D1	D2	D3	D4	D5
FEM	78,9	72,59	71,14	72,71	73,86	69,14	68,29
dp (±)	9,03	7,91	9,54	8,71	8,49	5,84	11,74
MASC	78,32	74,78	73,38	70,62	71,54	67,77	67,15
dp (±)	11,75	11,25	12,142	11,73	13,53	13,68	12,58
GERAL	78,61	73,68	72,6	71,35	72,35	68,25	67,55
dp (±)	10,39	9,58	11,09	10,58	11,82	11,38	11,99

Table 2 provides the percentage of decrease in HR Rep. during the combination of S 8 with S1 (S1-S8), S9 to S1 (S1-S9) and S9 to S8 (S8-S9) of girls, boys and general . Statistically significant (p <0.05) for the decrease in HR Rep. for S8 and S9 for all groups (female, male and overall) compared to S1. The largest percentage improvements were observed between S1-S8 for all groups (11.10%, 11.74% and 11.63%) for females, males and general respectively, without showing statistical differences between them. Within the S1-S8 improvements were verified in larger female group when compared to others. Already among the S8-S9, were the best values for the male group, followed by general and female.

Table 2: HR Rep. average during S1, S8 and S9 and% decrease in HR Rep. during the combination of S8 to S1 (S1-S8), S9 to S1 (S1-S9) and S9 to S8 (S9- S8) group male, female and general, improves the weeks GROUP (%)

GROUPS	Improve during the weeks (%)		
	S8-S1	**S9-S1**	**S9-S8**
FEM	8,69	11,10	2,21
MAS	4,73	11,74	6,69
GENERAL	6,69	11,63	4,63

Table 3 shows the ten possible combinations for all days (D1 to D5) for females, and males generally. There were no significant differences (p <0.05) decrease in HR Rep. between D1-D4 (0.029 *) and D3-D5 (0.035 *) for the male and D1-D4 (0.04), D2- D5 (0.015) and D3-D4 (0.034) for the general group. Greatest significance (p <0.01) were observed between D3-D5 (0.008) for females, D1-D5 (0.006) for males and D1-D5 (0.002) and D3-D5 (0.001) for group general.

Table 3: Combination of day and level of significance (Sig.) for FEM, MASC and GENERAL.

Combination of day	FEM	MASC	GENERAL
	Sig.	**Sig.**	**Sig.**
D1-D2	0,388	0,090	0,315
D1-D3	0,063	0,236	0,829
D1-D4	0,621	0,029*	0,040*
D1-D5	0,140	0,006**	0,002**
D2-D3	0,504	0,711	0,552
D2-D4	0,389	0,211	0,116
D2-D5	0,084	0,095	0,015*
D3-D4	0,168	0,131	0,034*
D3-D5	0,008**	0,035*	0,001**
D4-D5	0,840	0,748	0,703

*p<0,05, **p<0,01

It was noted that swimmers of both sexes showed a significant decrease in HR. Rep. during S9 located between the third and fourth days.

DISCUSSION

Some studies show that HR Rep. can be modified as a function of aerobic training (LEE, et al., 2003, NOVAIS et al, 2004). Corroborating these findings, the results of this study showed that significant decreases in HR Rep. with this method of training between the S1 and S9 (78,61 + 10,39 to 67,55 + 11,99) for both groups representing a decrease of 4.63% in the cardiac contractions per minute. The results presented are consistent with Rama (1997), noting that the decrease in HR Rep. is the first weeks of training.

Even with the improvement between S1 and S9 have been greater in the male group ranged from 78.32 to 67.15 beats per minute (bpm) than girls, which ranged from 78.90 to 68.29 bpm, no significant differences significant between the two in S1 nor in S9. These findings are corroborated by Uusitalo et al. (1999) and Bonaduce et al. (1998), in their longitudinal studies to identify HR Rep. reduction between 6 and 9 weeks of exercise training in individuals of both sexes.

We found higher values of bpm (p <0.01) between S1 and S8 for girls ranging from 78,90 + 9,03 to 72,59 +7,91 compared with the male group for whom there are 78 beats 32 + 11.75 + 11.25 to 74.78. When combined in check all day HR Rep. of S9 with the contribution of the reduction in the volume and intensity of training, significant differences (p <0.05 and <0.01) were observed in a few days. The male group showed significant improvements in the beginning, more precisely between the D1-D4 (0.029) and this trend was repeated between D3-D5 (0.035). When observing the D1 and D5 differences were even greater (0.006).

Although Maglischo (1999) has mentioned that there are significant differences in physiological implications for work in the aerobic exercise among swimmers of both sexes in this study these differences were not significant when compared to the group. Well, when considering the existence of a similar trend demonstrated in the male group, where it showed significant decreases in D1 combined with D4, the female group showed the same relationship, but two days after the combination D3-D5. Although there is a two-day delay in the decrease in HR Rep. compared to boys, this picture did not show significant differences.

Regarding the female group, significant changes (0.008) observed in D3-D5 link to cardiovascular adaptation period soon after reducing the volume and intensity training the same way as the male group. According Maglischo (1999) and Bonaduce et al. (1998), the reduction in HR Rep. due to an aerobic training is associated with physiological adaptation of cardiac output reflected in increased venous return and stroke volume. This measure, and to inform the positive cardiovascular adaptations may contribute to the identification of symptoms related to overtraining (Cunha et al, 2006). And, as quoted by Dressendorfer et al, (1985) and Stray-Gunderson et. al. (1986), increased from 60 to 10 bpm information, reliably, the diagnosis of overtraining.

The data from this study indicated that after 8 weeks of systematic training on submaximal (65% to 85% of maximal heart rate), HR Rep. values decreased significantly in young swimmers of both sexes and that the partial reduction the volume and intensity of training in the ninth week also had a positive effect on cardiovascular adaptations of them.

It is worth noting that the monitoring of the training program is an important process and cautious in sporting career and thus the positive adaptations by improving venous return and stroke volume represented by HR Rep. serve with a more user-friendly alternative to the analysis and control training in young swimmers.

CONCLUSION

The findings of this study indicated that the period of 8 weeks of aerobic training combined with partial reduction in the volume and intensity in five days, were sufficient to generate positive cardiovascular adaptations in HR Rep. in young swimmers.

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EFFECTS OF REDUCING THE VOLUME OF THE INTENSITY OF AEROBIC TRAINING ON RESTING HEART RATE IN YOUNG SWIMMERS.

ABSTRACT

Among the benefits of systematically sports for young people are factors related to health, growth, development, psychological well-being and improvement of motor skills. With the increasing participation of children and youth in this involving the systematic training, there is a preoccupation with the applied load and proper recovery. Given this fact, the goal of this study was to investigate the effect of aerobic training, reducing the volume and intensity of training on frequency (HR Rep.) of young swimmers. Twenty swimmers competing (7 females and 13 males) aged between 13 and 14 years were enrolled. For data analysis test was used for statistical analysis for paired samples. The results showed a decrease of 11.63% HR Rep. in both groups and improvement of 11.74% for boys and 11.10% for girls. Thus, this study was presented as a good indicator of cardiovascular adaptation by increasing venous return and stroke volume in young swimmers.

KEY WORDS: Swimming, Aerobic Training and Heart Rate

LES EFFETS DE LA RÉDUCTION DU VOLUME ET DE L'INTENSITÉ DE L'ENTRAÎNEMENT AÉROBIE DANS LA FRÉQUENCE CARDIAQUE DE REPOS EN JEUNES NAGEURS.

RÉSUMÉ

Dans les bénéfices de la pratique sportif rassemblées pour population des jeunes, se trouvent les facteurs rapportés à la santé, à la croissance, au développement, au bien-être psychologique et à l'amélioration des habilités motrices. Avec la croissante participation d'enfants et des jeunes en activités, qui s'impliquent l'entraînement systématisée, apparaît la préoccupation avec le chargement appliqué et la récupération appropriée. Compte tenu de ce fait, l'objectif du présente étude est la vérification du l'effet de l'entraînement aérobie, de la réduction du volume et de l'intensité du l'entraînement dans la fréquence de repos (FC Rep.) de jeunes nageurs. Vingt nageurs concurrents (7 du sexe féminin et 13 du sexe masculin) entre 13 et 14 ans ont participé de l'étude. Pour l'analyse des données a été utilisé l'essai d'analyse statistique pour échantillons pareadas. Les résultats ont présenté la diminution de 11.63% de FC Rep. dans les tous les deux groupes et améliorations de 11.74% pour les garçons et de 11.10% pour les filles. En étant ainsi, le présente étude s'est présenté comme un bon indicatif d'adaptation cardiovasculaire à travers l'augmentation du retour veineux et un volume systolique en nageurs jeunes.

MOT CLÉS: Natation, l'entrainement aérobie et de la Fréquence Cardiaque.

EFECTOS DE REDUCIR EL VOLUMEN DE LA INTENSIDAD DEL ENTRENAMIENTO AEROBIO SOBRE RITMO CARDÍACO DE RECLINACIÓN EN NADADORES JOVENES.

EXTRACTO

Entre las ventajas de deportes sistematizada para los jóvenes están los factores relacionados con la salud, el crecimiento, el desarrollo, el bienestar psicológico y la mejora de las habilidades motoras. Con la participación cada vez mayor de niños y de la juventud en esto que implica el entrenamiento sistemático, hay una preocupación con la carga aplicada y la recuperación apropiada. Debido a este hecho, el propósito de este estudio és investigar el efecto del entrenamiento aerobio, reduciendo el volumen y la intensidad del entrenamiento sobre la frecuencia (representante de la hora.) de nadadores jóvenes. Veinte nadadores competidores (7 niñas y 13 niños) entre 13 y 14 años fueran alistados. Los datos de la prueba fueran utilizados para el análisis estadístico para las muestras apareadas. Los resultados demostraron una disminución del representante de 11.63% en los dos grupos y la mejora de 11.74% para los muchachos y 11.10% para las muchachas. Así, este estudio fue presentado como buen indicador de la adaptación cardiovascular aumentando el volumen venoso de la vuelta y de movimiento en nadadores jóvenes.

PALABRAS CLAVES: Natación, Entrenamiento Aeróbico e Ritmo cardíaco.

EFEITOS DA REDUÇÃO DO VOLUME E DA INTENSIDADE DO TREINAMENTO AERÓBIO NA FREQUÊNCIA CARDÍACA DE REPOUSO EM JOVENS NADADORES.

RESUMO

Dentre os benefícios da prática esportiva sistematizada para a população jovem encontram-se os fatores relacionados à saúde, crescimento, desenvolvimento, bem-estar psicológico e melhoria das habilidades motoras. Com a crescente participação de crianças e jovens em atividades deste que envolvem o treinamento sistematizado, surge a preocupação com a carga aplicada e a recuperação adequada. Diante deste fato, o objetivo do presente estudo foi verificar o efeito do treinamento aeróbio, da redução do volume e da intensidade do treinamento na frequência de repouso (FC Rep.) de jovens nadadores. Vinte nadadores competidores (7 do sexo feminino e 13 do sexo masculino) com idade entre 13 e 14 anos participaram do estudo. Para a análise dos dados foi utilizado o teste de análise estatística para amostras pareadas. Os resultados apresentaram diminuição de 11,63% da FC Rep. em ambos os grupos e melhoras de 11,74% para os meninos e de 11,10% para as meninas. Sendo assim, o presente estudo apresentou-se como um bom indicativo de adaptação cardiovascular através do aumento do retorno venoso e volume sistólico em nadadores jovens.

PALAVRAS-CHAVES: Natação, Treinamento Aeróbio e Frequência Cardíaca