마라톤선수의 연속적 고지훈련 후 심폐기능, 혈액세포, EPO 및 사이토카인농도의 변화

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Abstract

Kim, K. J., Kim, S. H., Byon, J. Y., Hong, C. B., Ahn, N. Y., Kim, J. H., Kim, H. H. Changes of cardiopulmonary function, blood cell parameters, erythropoietin, and cytokines after successive altitude training in marathoners. *Exercise Science*. 20(2): 119-130, 2011. This study analyzed the changes of cardiopulmonary function, blood cell parameters, erythropoietin (EPO), and cytokines after a successive altitude training of 4 week-Kunming (1,950m) and 8 week-Eldoret (2,200m) in marathoners. Subjects were 20-aged elite marathoners, and were divided into two groups as altitude training group (N=5) and control group (N=4). We measured the cardiopulmonary function of submaximal and graded treadmill testing, blood cell parameter, body composition, blood concentration of EPO and cytokines before and after altitude training. After altitude training, altitude training group showed a significant increase of cardiopulmonary function as maximal oxygen uptake and exercise duration to all-out in graded treadmill testing. This improvement of cardiopulmonary function can extend to 2 weeks after altitude training. And the subjects showed the limitation of physiological function during Eldoret. After altitude training, altitude training group showed a significant positive changes of erythrocyte number, hemoglobin and EPO concentration. Because a successive altitude training of 4 week-Kunming and 8 week-Eldoret is apt to develop a fatigue in marathoners, we should check the detailed changes of physiological function in long duration of altitude training.

Key words : marathoner, altitude training, erythropoietin (EPO), cardiopulmonary function, lactate, heart rate

초 록

김기진, 김상현, 변자영, 홍창배, 안나영, 김재훈, 김홍화. 마라톤선수의 연속적 고지훈련 후 심폐기능 및 혈액세포, 에리스로포이에틴(EPO) 및 사이토카인농도의 변화. *운동과학*, 제20권 제2호, 119-130, 2011. 본 연구는 중국 쿤밍 (1,950m)에서의 4주간과 케냐 엘도렛 (2,200m)에서 8주간의 고지훈련을 연속적으로 실시하는 과정에서 마라톤선수들의 심폐기능 및 혈액세포, EPO 및 사이토카인농도의 변화를 분석하였다. 연구대상자는 20대 우수한 마라톤선수로서 고지훈련그룹 5명과 평지훈련의 통제그룹 4명으로 구성하였다. 고지훈련 전과 쿤밍에서의 4주간 고지훈련 후, 엘도렛 현지, 엘도렛훈련 후 평지로 되돌아온 1주, 2주 및 3주경과 후에 각각 신체구성, 최대하 및 최대운동검사, 혈액세포, 혈중 EPO 및 사이토카인농도 등을 각각 측정하였다. 고지훈련 후 심폐기능이 향상된 것으로 나타났으며, 고지훈련을 마친 후 평지로 되돌아 온 2주경과시부터 개선되어 3주까지 지속되는 것으로 생각된다. 2주경과시가 가장 우수한 심폐기능을 나타냈다. 엘도렛 체류시 생리적 기능은 제한되는 양상을 나타냈다. 적혈구수 및 헤모글로빈농도는 고지훈련 후 긍정적인 효과를 나타내며, 아울러 혈중 EPO농도도 현저하게 증가되는 것으로 나타났다. 그러나 혈액세포변인의 변화는 고지훈련의 기간이 계속적으로 연장될 경우 지속되지 않는 것으로 나타났다. 쿤밍훈련 4주와 엘도렛훈련 8주의 연속적인 고지훈련은 선수들의 피로현상을 초래할 가능성이 있기 때문에 지나친 장기간의 고지훈련은 신중하게 검토해야 할 것으로 생각된다.

주요어 : 마라톤, 고지훈련, 에리스로포이에틴 (EPO), 심폐기능, 젖산, 심박수

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