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The Effects of 6 Weeks of Wrestling Training in Warm Weather and Cold on Levels of Troponin I and IL-1 β Plasma in Troponin I in Teenager Wrestlers

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Abstract: Pro-inflammatory cytokines have been noted to increase following exercise but their relationship to exercise-induced cardiac dysfunction has not previously been investigated. The aim of this study was to investigate the effects of 6 weeks of wrestling training in warm weather and cold on levels of troponin I and IL-1 β plasmain troponin I in teenager wrestlers. For this purpose, 24 wrestlers with an average weight of 64.81±6.25 kg, age 19.12±0.22 year and BMI of 21.72±0.56 kg. Square meter were randomly divided into 3 groups: warm weather, cold weather and control were divided. Blood samples from subjects in two phases, 48 h before the first session and 48 h after the last training session in the amount of 5 mL were taken from the brachial vein. The subjects in the wrestling specialized training was performed circular training during the 6 weeks in the two conditions of warm weather and cold. To analyze the data, t-test and ANOVA were used. Tukey's test was used in significantly. The results showed that changes in levels of plasma troponin I was no significant difference between groups. Also after wrestlers trained in the cold weather levels of IL-1β plasma was a significant decrease, while the wrestlers trained in warm weather increased levels of IL-1β plasma but no significant increase. The results show that the probably increase in body temperature leads to an increase in the release of IL-1 β. It is possible that in flammatory cytokinesin predicting cardiovascular disease are more accurate and have an important role in the development of atherosclerosis.

Key words: Wrestling training, warm weather and cold, troponin I, IL-1 β, cardiac dysfunction

INTRODUCTION

Coronary Heart Disease (CHD) is the single largest cause of death in the developed countries and is one of the leading causes of disease burden in developing countries as well. Reduction of heart oxygen supply due to coronary obstruction leads to diminution of oxygen supply to the mitochondria to support oxidative phosphorylation and eventually ischemia (Noonan *et al*., 2012). The aim of the present study was to demonstrate the physiological The effects of 6 weeks of wrestling training in warm weather and cold on levels of troponin I and IL-1 β plasma in troponin I in teenager wrestlers.

Exercise training confers sustainable protection against myocardial infarction in animal models and has been associated with improved survival following a heart attack in humans (Barari *et al*., 2012). Cardiac Troponin (cTnI) has been established as one of the most useful biomarkers for risk assessment and management of suspected acute coronary syndrome patients. Previous studies reported that elevated (cTnI) levels are highly specific for cardiac injuries (Koller and Schobersberger, 2009).

Troponin tests are primarily ordered to help diagnose a heart attack and rule out other conditions with similar signs and symptoms. Either a troponin I or troponin t-test can be performed; usually a laboratory will offer one test or the other. The concentrations are different but they basically provide the same information. Troponin I and troponin T are proteins found in heart muscle and are released into the blood when there is damage to the heart (Koller and Schobersberger, 2009; Lee *et al*., 2011).

Also, the immune functions such as cytokine changes can be influenced by physical training including wrestling training. Cytokines are considered as immunoregulatory molecules for regulation of immune function and other body responses (Lee *et al*., 2011). These molecules are a group of small peptides released from white blood and other body cells in response to different stimuli. Wrestling training are considered as stressors which induce local or systemic responses

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including cytokine changes. Pro-inflammatory cytokines which are mainly produced in wrestling training are IL-1B. As well as muscle damage is considered to be the major source of increasing plasma IL-1B during exercise (McCarthy and Esser, 2012).

Usually our motivation to win or complete a certain task leads us to ignore effective thermoregulatory strategies and this usually causes lower performance injuries and heat related illnesses. On top of thermoregulatory strategies during physical activity, there are also several pre and post-exercise strategies that aid us in performing better and avoiding injuries (Hoffman *et al*., 2004).

Regular physical activity enhances and maintains health, this is particularly true in hot and humid weather which cannot only lead to poor athletic performance but also to heat stress and even death (Christenson and Phillips, 2011). Some studies suggest that rough winter weather may increase a person's risk of heart attack due to over exertion. Besides cold temperatures, high winds, snow and rain also can steal body heat.

Heat stress can come in the form of heat cramps (painful cramps in abdominal muscles and muscles of the extremities), heat syncopes (weakness, fatigue and fainting), heat exhaustion due to water and salt depletion (causing exhaustion, muscle cramps, nausea, vomiting, dizziness, elevated temperature, weakness headaches, etc.) and heat strokes due to failing thermoregulation (causing nausea, seizures, disorientation and in severe cases unconsciousness or comatosis) (Hoffman *et al*., 2004; Christenson and Phillips, 2011).

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Statistics present a dismal picture in India. About 3 million people die of heart disease and stroke every year. The 30% of all deaths are caused by heart disease and stroke. The 118 million have hypertension which will double to 213 million by 2025. About 10% 0f people over 20 years of age in urban India have heart disease (Christenson and Phillips, 2011; Mollica *et al*., 2012).

In their new studies with seven individuals, four afflicted with FCAS and three normal subjects the investigators determined that cryopyrin regulates the release of interleukin-1 (IL-1), an important mediator of fever and systemic inflammation during the body's initial immune response. After finding increased levels of IL-1 in the skin of the FCAS patients following an experimental cold challenge the researchers administered a recombinant IL-1 receptor antagonist, a drug called Anakinra which inhibits the action of IL-1 and thus prevents acute inflammation, fever and flu-like symptoms. The treatment prior to cold exposure prevented the clinical and laboratory manifestations of the disease in the FCAS patients (Scheett *et al*., 2002).

Cytokines (IL-1β) were analyzed by flow cytometry from serum samples collected within 50 min of race completion. Cardiac Troponin (cTnI) was combined with an echocardiographic assessment of cardiac function (Mollica *et al*., 2012; Scheett *et al*., 2002). This study is semi-experimental. Statistic society of this study was wrestlers males in Behshahr City that at least 2 years had wrestling regular training.

MATERIALS AND METHODS

Statistic samples is concluded of 24 wrestlers male (age: 15±1 years) samples wich was selected from randomly. Selection of samples in three groups of 8 individuals included: wrestlers group in warm weather (Ww, n = 8), wrestlers group in cold weather (Cw, n = 8) and control group (C, n = 8). In this research was temperature of warm weather 25-27°C and temperature of cold weather was 10-12°C.

Subjects were wrestler at baseline. They were non-smokers and free from gastrointestinal, cardiovascular or metabolic disorder. Wrestling training program for 6 weeks, three times in week and for 75 min was performed. Start with warm up exercises include running, the muscles relax and stretch the body which was run for 10 min. Wrestler training program was includesa circular training in 8 stations. At each station were performed one of the techniques. Wrestling techniques have been performed in every station at the time of 8-10 sec.

This training was execution in 60-80% Heart Rate Reserve (HRR) (Liburt *et al*., 2010). In final of 6 weeks of wrestler training program, selection factors between pre and post test were compared. Troponin I and IL-1 β were measured with ELISA was performed using a special kit.

After 12 h over-night fasting in pre and post study blood sampling for troponin I and IL-1 β analyses were drawn from a forearm vein. Weight and height measurements (to the nearest 0.1 kg and 0.1 cm, respectively) were performed using a balance beam scale and studio meter and BMI was calculated as weight in kilograms divided by height in meter squared ($kg.m^2$). The t-test and one-way analysis of variance were used. To determine within and between groups different, Tukey test was used to show the significant changes in each variables.

Table 1: Dependent variables pre and post training

		M±SD	
Characteristic	Groups	Pre-training	Post-training
Troponin I	Ww	0.0033 ± 0.0014	0.0027±0.0011
(ng.mL)	Cw	0.003 ± 0.0013	0.002± 0.001
	C	0.0033± 0.0015	0.0027±0.0011
IL-1β	Ww	41.82 ± 24.95	24.58 ± 22.78
(ng.mL)	Cw	25.21 ± 20.07	17.47 ± 12.32
	C	31.60 ± 27.73	24.58 ± 22.78

RESULTS AND DISCUSSION

The effects of wrestling training on levels of troponin I and IL-1 β plasma are summarized in Table 1. The results show that 6 weeks of wrestling training could significant decrease inlevels of troponin I. Plasma during cold weather ($p = 0.033$, $t = -2.646$). By comparing the data by using t-test showed that the 6 weeks of wrestling training could significant decrease inlevels of troponin I plasma during warm weather ($p = 0.011$, $t = -3.416$).

The results of this study showed that 6 weeks of wrestling training in cold weather could have significant decrease in plasma levels of interleukin-1 β ($p = 0.044$, $t = -2.459$). Also, the 6 weeks of wrestling training could not significant changes in in levels of troponin I plasma during warm weather ($p = 0.247$, $t = 1.264$).

Analysis of data by using ANOVA test showed that no significant difference between groups of subjects in a mount of troponin I plasma ($t = 0.522$, $F = 0.670$) .

Also analyzes data by using ANOVA test showed that a significant difference between groups of subjects in amount of IL-1β in plasma ($p = 0.016$, $F = 5.053$) . Also, Tukey test showed differences among groups in value of IL-1β plasma.

Significant difference was between the values of IL-1β is a warm weather and cold weather ($p = 0.026$) and warm weather and control group ($p = 0.037$).

CONCLUSION

The present study was performed with the aim of assessing 6 weeks of wrestling training in warm weather and cold on levels of troponin I and IL-1 β plasmain troponin I. The findings show that level of plasma troponin I in training wrestlers in cold weather, hot weather and the control group was significantly decrease compared the pre-test.

A high troponin and even slight elevations may indicate some degree of damage to the heart. When a person has significantly elevated troponin levels and in particular, a rise in the results from a series of tests done over several hours, then it is likely that the person has had a heart attack or some other form of damage to the heart. Levels of troponin can become elevated in the blood within 3 or 4 h after heart injury or intensity training like wrestling training may remain elevated for 10-14 days. Butin this training was adaptation with wrestling training cause reduces values of troponin I (Koller and Schbersberger, 2009; Mollica *et al*., 2012).

Cold weather is associated with a higher risk of severe heart attack, according to research presented at ESC congress today, adult cardiology resident at the University of Manitoba in Winnipeg, Canada. The 6 year study found that each 10°C drop in temperature was associated with a 7% increased risk of ST-Elevation Myocardial Infarction (STEMI) the most severe form of heart attack. But wrestling trainingin cold weather cause training adaptation and reduces of troponin I (Mollica *et al*., 2012).

Wrestling training in warm weather and cold on levels of troponin I and IL-1 β plasmain troponin I in teenager wrestlers. We further demonstrated that 6 weeks of wrestling training significantly decreases serum IL1-β concentration.

These findings showed that a reduction in an acute-phase inflammatory response, after daily training adaptation, cause decreased cytokine gene and IL-1β expression. These established biological actions suggest that adaptation in wrestling training could block the increase in IL-1β. Wrestling training induced increased cytokine protein expression in the skeletal muscle. Done researches in changing of immune research responses with body training have shown that body training cause increasing of cytokinins in athlete's body. But wrestling training in weather warm and cold can adaptation hard activity on immune function (Lee *et al*., 2011; Hoffman *et al*., 2004).

Although, many of studies mentioned that 13 weeks endurance training decreased the inflammatory cytokines IL-1 β (Liburt *et al*., 2010). In this regard, it was most recently suggested that troponin I which is involved in sensing the intracellular Ca^{2+} levels is a target of ROS. Oxidized cysteine residues of troponin I can react with the antioxidant glutathione which helps protect the molecule from oxidative stress and make the contractile apparatus much more sensitive to Ca^{2+} (Mollica *et al*., 2012).

In conclusion, the results of this investigation indicate that wrestling training improved muscular performance and decrease the troponin I and IL-1β concentration.

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