

## The Effect of Physical Exercise to Level of Nuclear Factor Kappa B on Serum, Macrophages and Myocytes

**Authors :** Eryati Darwin, Eka Fithra Elfi, Indria Hafizah

**Abstract :** Background: Physical exercise induces a pattern of hormonal and immunological responses that prevent endothelial dysfunction by maintaining the availability of nitric oxide (NO). Regular and moderate exercise stimulates NO release, that can be considered as protective factor of cardiovascular diseases, while strenuous exercise induces increased levels in a number of pro-inflammatory and anti-inflammatory cytokines. Pro-inflammatory cytokines tumor necrosis factor- $\alpha$ ; (TNF- $\alpha$ ;) triggers endothelial activation which results in an increased vascular permeability. Nuclear gene factor kappa B (NF- $\kappa$ B) activates biological effect of TNF- $\alpha$ ;. Aim of Study: To determine the effect of physical exercise on the endothelial and skeletal muscle, we measured the level of NF- $\kappa$ B on rats's serum, macrophages, and myocytes after strenuous physical exercise. Methods: 30 male *Rattus norvegicus* in the age of eight weeks were randomly divided into five groups (each containing six), and there were treated groups (T) and control group (C). The treated groups obtain strenuous physical exercise by ran on treadmill at 32 m/minutes for 1 hour or until exhaustion. Blood samples, myocytes of gastrocnemius muscle, and intraperitoneal macrophages were collected sequentially. There were investigated immediately, 2 hours, 6 hours, and 24 hours (T1, T2, T3, and T4) after sacrifice. The levels of NF- $\kappa$ B were measured by ELISA methods. Results: From our study, we found that the levels of NF- $\kappa$ B on myocytes in treated group from which its specimen was taken immediately (T1), 2 hours after treadmill (T2), and 6 hours after treadmill (T3) were significantly higher than control group ( $p < 0.05$ ), while the group from which its specimen was taken 24 hours after treadmill, was no significantly different ( $p > 0.05$ ). Also on macrophages, NF- $\kappa$ B in treated groups T1, T2, and T3 was significantly higher than control group ( $p < 0.05$ ), but there was no difference between T4 and control group ( $p > 0.05$ ). The level of serum NF- $\kappa$ B was not significantly different between treatment group as well as compared to control group ( $p > 0.05$ ). Serum NF- $\kappa$ B was significantly higher than the level on macrophages and myocytes ( $p < 0.05$ ). Conclusion: This study demonstrated that strenuous physical exercise stimulates the activation of NF- $\kappa$ B that plays a role in vascular inflammation and muscular damage, and may be recovered after resting period.

**Keywords :** endothelial function, inflammation, NF $\kappa$ B, physical exercise

**Conference Title :** ICABNB 2017 : International Conference on Advanced Biomedicine and Network Biology

**Conference Location :** Osaka, Japan

**Conference Dates :** March 30-31, 2017