

Original Research Article

## Effect of 30 Minutes Brisk Walking on Hemoglobin Concentration and Leukocyte Count

Pujan Bhusal<sup>1</sup>, Sameer Timilsina<sup>1</sup>, Dipak Sharma<sup>2</sup>

<sup>1</sup>Lecturer, <sup>2</sup>Assistant Professor,  
Department of Physiology, Chitwan Medical College, Chitwan, Nepal.

Corresponding Author: Pujan Bhusal

### ABSTRACT

Walking is an isotonic exercise and has been associated with physiological changes in many systems including hematological system. The aim of this study was to examine acute changes in some of the blood parameters after a 30 min of brisk walk in fifty young healthy subjects of Chitwan, Nepal. The venous blood samples were drawn before & after 30 minutes of brisk walking. Estimation of hemoglobin concentration, total leukocyte count and differential leukocyte count was determined. Statistical data was analyzed using SPSS software version 20. Dependent t-test was used to compare the means before and after the walk. The study demonstrated that brisk walk for even 30 minutes has some positive influence on blood parameters. Hemoglobin concentration, Leukocyte count, Neutrophil percentage were increased significantly ( $p < 0.05$ ) while lymphocyte was decreased. It was concluded that brisk walking is also physiological stress to body which is healthy and also leads to improvement in hemodynamic status.

**Key words:** brisk walk, hemoglobin concentration, leukocyte count

### INTRODUCTION

Walking is a physical activity which requires no special skills or facilities and is feasible to almost all age groups. [1] Walking has been described as nearest to perfect exercise. [2] One of the best features of exercise is to relieve pain by activating endogenous analgesic system. Brisk walking is an exclusive home based exercise program where participation number are high than other alternative aerobic exercise, such as running or cycling. [3] Exercise bring changes in many system in our body including, hematology. [4] Blood components may vary, if examined before and after exercise at various duration and intensities. [5] Hemoglobin concentration and leukocyte count has been shown to increase after exercise. [6,7] Exercise induced changes in hematological parameters clearly indicates the beneficial effects of exercise. [8] This

study is one of the variables correlating study relevant to the effect of exercise in various hematological parameters. This study would be fruitful for the effective promotion of the health and does provide useful information. As per the study documented nowadays even people of Nepal are more conscious towards their health issue. [9]

### METHODS

Fifty healthy subjects both female, (n=25) and male (n=25) aged between 18–29 years, were examined for haematological investigations before and after exercise. All the subjects were healthy, had no indication of musculoskeletal injury. All of them submitted their written consents to participate after having been informed about the study protocol. The protocol was approved by institutional Review

Committee of College of Medical Sciences and Teaching Hospital. The venous blood sample was drawn before & immediately after 30 minutes of brisk walking. Haemoglobin (Hb) was estimated by Sahli's haemometer, while improved Neubauer chamber was used for Total Leukocyte Counts (TLC). Blood smears were prepared and blood films stained with Leishman's stain for Differential Leukocyte Counts (DLC). Compound microscope was used throughout the study.

### 2.1. Statistical Analysis

All data were presented as mean ± standard deviation. Comparison, between pre and post-exercise, was performed through the dependent t- test in order to examine the mean of the parameters before and after exercise with p values <0.05 considered significant. Data were analyzed on SPSS software version 20.

## RESULTS

Table 1.Comparison of parameters before and after exercise (30 min brisk walk)

Variables	Before Exercise	After Exercise	p-value
Hemoglobin levels (gm/dL)	14.12±1.00	14.42±1.00	<0.001*
Total Leukocyte Count (mm <sup>3</sup> )	6182±1138.23	7650±2129.60	<0.001*
Neutrophil (%)	61.94±6.97	65.36±6.99	<0.001*
Basophil (%)	0.10±0.30	0.16±0.37	0.260
Eosinophil (%)	2.44±0.97	2.40±0.96	0.420
Monocyte (%)	3.96±1.12	4.02±1.04	0.260
Lymphocyte (%)	31.54±6.21	28.08±6.27	<0.001*

\*-significance

## DISCUSSION

In present study the mean hemoglobin level of the study participants was increased significantly after exercise. This finding is in line with those of Choudary et al. [10] but is contrast with Arazi et al. [11] The increase in hemoglobin concentration resulting from acute exercise is primarily due to movement of fluid between vascular and interstitial compartments. [12] The study by Davis et al. [13] indicates the importance of regular exercise in improving sustained capacity to supply oxygen to the tissues at raised level on demand and by increasing cardiac output

by diverting iron stores towards synthesis hemoglobin. Rise in hemoglobin may be due to decrease in plasma volume leading to increase in hemoglobin. [14] Statistically significant increased in total leukocyte was observed after brisk walk. In similar studies [15-17] increase in WBC after exercise was observed. The leucocytosis after exercise could be due to a number of factors like, demargination, the actions of catecholamines, cortisol, neuronal transmitters and peptides [18] or decrease in plasma volume. [19] Nevertheless, it is inconsistent with findings of Simonson et al. [20] who reported not significant rise for WBC counts. This difference may be due to the fact that unlike our study the subject in study had gone through resistance exercise.

The increase in neutrophils may be due to release of the hormone adrenaline. [21] Several studies [22,23] also reported about Neutrophilia of greater magnitude after exercise. Regarding basophil count, eosinophil count and monocyte count we did not find any significant changes. Simonson et al. [20] reported that basophil cell seems to be unresponsive to exercise stress. Yet Deilami et al. [23] have reported increase in eosinophil and also monocyte count after anaerobic and short-term highly intensive exercise. In contrast to our studies several studies [24,25] with moderate-intensity exercise indicate a modest increase in the total number of circulating monocytes. Regarding increase in monocyte may be due to demargination, mediated beta2 adrenergic receptors. The present study showed that Lymphocyte percent decreases significantly after exercise. Similar to our study Suzuki et al. [22] Gleeson et al. [26] observed peripheral lymphocytopenia after termination of exercise. Unlike our study Nelsen et al. [27] found lymphocyte proliferation following exercise. He reasoned that after exercise change in blood flow to these muscles and spleen could affect the number of circulating lymphocytes.

## CONCLUSION

Although the theory of acute rise in hematological parameters following exercise has been debated, the study, despite of its small sample size, has confirmed rise in hematological parameters following 30 minutes brisk walk.

## REFERENCES

1. Davison RC, Grant S .Is walking sufficient for exercise? Sports Med. 1993;16(6):369-73
2. Morris JN, Hardman AE .Walking to health. Sports Med. 1997; 23(5):306-32.
3. Kimberley, B.B., & Pargman, D. The effects of Yoga versus Exercise on stress, anxiety, and depression in older adults. International Journal of Yoga therapy.2009;19:79
4. Tayebi Morteza S, Ghanbari-Niaki A, Nazar-Ali P, Ghorban-alizadeh FG. Ramadan fasting and weight-lifting training on vascular volumes and hematological profiles in young male weight-lifters. Global Journal of Health Science. 2010;2(1):160-6.
5. Yalcin O, Bor-Kucukatay M, Senturk UK, Baskurt OK. Effects of swimming exercise on red blood cell rheology in trained and untrained rats. J Appl Physiol 2000;88(6):2074-80.
6. Edwards HT ,Woods W. A study of leukocytosis in exercise. Arbeit Physiologie. 1932;6:73-82.
7. Brun JF. Exercise hemorheology as a three acts play with metabolic actors: is it of clinical relevance? Clin Hemorheol Microcirc. 2002;26(3):155-74.
8. Saeid G and Ismail L.Exercise and the Cardiovascular System. Journal of Cardiology Research and Practice.2012 Article ID 210852
9. Pokherl R.Fitness:A dynamic trend in kathmandu.Abhiyan[online]Available at :<http://www.newbussinessage.com/MagazineArticles/view/734>[Accessed 6th sep.2017]
10. Choudhary S, Rajnee, Binawara BK. Effect of exercise on serum iron, blood haemoglobin and cardiac efficiency. J Postgrad Med Inst. 2012;26(1):13-6.
11. Arazi H, Damirchi A,Mostafaloo A. Variations of hematological parameters following repeated bouts of concurrent endurance resistance exercise. J Med Sci. 2011;9(2):48-52
12. Ziegler-Heitbrock W, Ulevitch RJ. CD14: cell surface receptor and differentiation marker. Immunol Today. 1993;14(3):121-5.
13. Davis WJ, Wood DT, Andrews RG, Elkind LM, Davis WB. Concurrent training enhances athletes' cardiovascular and cardiorespiratory measures. J Strength Cond Res. 2008;22(5):1503-14
14. S. Ahmadizad and M. S. El-Sayed. The acute effects of resistance exercise on the main determinants of blood rheology. Journal of Sports Sciences, 2005; 23(3): 243-49
15. Oshida Y, Yamanouchi K, Hayamizu S, Sato Y. Effect of acute physical exercise on lymphocyte subpopulations in trained and untrained subjects. Int J Sports Med. 1988;9(2):137-40.
16. Benoni G, Bellavite P, Adami A, Chirumbolo S, Lippi G, Brocco G, et al. Effect of acute exercise on some haematological parameters and neutrophil functions in active and inactive subjects. Eur J Appl Physiol Occup Physiol. 1995;70(2):187-91.
17. Alexandra A, Avloniti, Helen T. Douda, Savvas P. Tokmakidis, Alexandros H. Kortsaris, Evropi G. Papadopoulou, and Emmanouil G. Spanoudakis. Acute effects of soccer training on white blood cell count in elite female players. Int J Sports Physiol. 2007;2:239-49.
18. Becker Mde M, Barbosa e Silva O, Moreira IE, Victor EG. Arterial blood pressure in adolescents during exercise stress testing. Arq Bras Cardiol. 2007;88(3):329-33.
19. McCarthy DA, Dale MM. The leucocytosis of exercise. A review and model. Sports Med. 1988;6(6):333-63.
20. Simonson SR, Jackson CG. Leukocytosis occurs in response to resistance exercise in men. J Strength Cond Res. 2004;18(2):266-71.
21. Ali S, Ullah F, Jan R. Effects of intensity and duration of exercise on differential leucocyte count. J Ayub Med Coll Abbottabad. 2003;15(1):35-7.
22. Suzuki K, Naganuma S, Mochizuki M, Shiraishi M, Nakaji S, Sugawara K, et al. Differential patterns of the number and proportion of blood leukocytes following endurance exercise of moderate, strenuous and severe conditions. Nihon Eiseigaku Zasshi. 1995;50(2):631-6.

23. Deilami A, Sangari M and Shojaeimehr M T. The effect of two intensive aerobic and anaerobic tests on immune system in male athletic students in Iran. *World Applied Sciences Journal*. 2013;21(10):1530-9.
24. Alexandra A, Avloniti, Helen T. Douda, Savvas P. Tokmakidis, Alexandros H. Kortsaris, Evropi G. Papadopoulou, and Emmanouil G. Spanoudakis. Acute effects of soccer training on white blood cell count in elite female players. *Int J Sports Physiol*. 2007;2:239-49.
25. Zieker D, Fehrenbach E, Dietzsch J, Fliegner J, Waidmann M, Nieselt K, et al. cDNA microarray analysis reveals novel candidate genes expressed in human peripheral blood following exhaustive exercise. *Physiol Genomics*. 2005;23(3):287-94.
26. Gleeson M, Robertson JD, Maughan RJ. Influence of exercise on ascorbic acid status in man. *Clin Sci*. 1987;73(5):501-5.
27. Nielsen HB. Lymphocyte responses to maximal exercise: a physiological perspective. *Sports Med*. 2003;33(11):853-67.

How to cite this article: Bhusal P, Timilsina S, Sharma D. Effect of 30 minutes brisk walking on hemoglobin concentration and leukocyte count. *Int J Health Sci Res*. 2017; 7(11):70-73.

\*\*\*\*\*