EFFECT OF SUBMAXIMAL EXERCISE ON SYSTOLIC AND DIASTOLIC BLOOD PRESSURE IN YOUNG SEDENTARY NORMOTENSIVE NEPALESE MEDICAL STUDENTS

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ABSTRACT
Higher exercise blood pressure represents low cardiorespiratory status of an individual and vice versa. The changes in systolic and diastolic blood pressure in response to rhythmic isotonic muscular exercise in sedentary young normotensive Nepalese students were assessed. Normal blood pressure in standing posture in male and female subjects are about 115 / 75 mm of Hg. and 106 / 71 mm of Hg, respectively. Just after the exercise systolic blood pressure increases moderately in both the sexes, whereas diastolic blood pressure remains unchanged in most of the females. Diastolic blood pressure is found to be decreased slightly in the males, just after exercise. The present study indicates the cardiorespiratory status of the Nepalese medical students is within normal range.

INTRODUCTION
Exercise blood pressure has a prognostic value in the assessment of cardio-respiratory status of an individual. Higher blood pressure response during sub-maximal exercise indicates low cardio-respiratory fitness.1 Changes in diastolic blood pressure during exercise is found to be greater in persons with type II diabetes than in non-diabetics.2 In hypertensives isotonic exercise causes too much increase in systolic blood pressure, which may reach 210 mm of Hg.3 During rhythmic muscular exercise the systolic blood pressure rises, whereas diastolic blood pressure remains almost unchanged in normotensive athletes4 but reports are scanty about the changes in blood pressure in response to isotonic exercise in sedentary normotensive Nepalese. In the present study our aim is to observe the change in the systolic and diastolic blood pressure after isotonic exercise (light to moderate) in young (age 19 – 20 years) sedentary normotensive Nepalese students.

MATERIALS AND METHODS
Healthy students our medical college (male-44 and female-32) having no history of illness of participated as volunteers in the present study and considered as sedentary as they don't exercise regularly. Blood pressure of each subject was recorded with the help of mercury sphygmomanometer before exercise in standing position. Then the subject is requested to jog for 3 minutes with riva-rocci cuff wrapped on his/her arm. This was detached from the manometer just before the starting of jogging. Immediately after the exercise the rubber tube of the riva-rocci cuff was re-joined to the manometer and blood pressure was recorded. As exercise heart rate never exceeded 140/min., the level of exercise was considered as submaximal.5 Systolic pressure was determined at the point at which the Korotkoff's sound became audible (1st phase), whereas diastolic blood pressure was measured at point at which the sound suddenly became faint (4th phase of Korotkoff's sounds).6 During the study ambient temperature was 27 to 29 degree centigrade and humidity was 72% to 75%. Statistical analysis was done by Z - test.

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DISCUSSION

The exercise performed by our subjects is rhythmic muscular exercise (jogging) and not a resistance exercise. In this type of exercise blood vessels in the active muscle enhance blood flow through a large portion of the body. In isotonic muscle contraction there is a prompt increase in heart rate along with a marked increase in stroke volume. Cardiac output is the product of heart rate and stroke volume. So, cardiac output rises in exercise. It may reach 24 l/min during isotonic exercise. Increased venous return in isotonic exercise may partly contribute to increased cardiac output. (Venous return in exercise is increased by the great increase in the activity of muscles and thoracic pumps; by mobilisation of blood from viscera, by increased pressure transmitted through dilated arterioles to the veins and by noradrenergically mediated vasoconstriction which decreases the volume of blood in the veins). Increases in cardiac output increase the systolic blood pressure. It is evident from the tables that in both male and female volunteers’ systolic blood pressure rises moderately during and just after exercise.

On the other hand there is a net fall in total peripheral resistance due to vasodilatation in exercising muscles. Diastolic blood pressure provides information about the systemic vascular resistance. If vasodilatation is marked (due to accumulation of lactic acid and the heat of metabolism in active muscles) in that case diastolic blood pressure will be slightly less as we noticed in case of our male volunteers. It indicates that exercise performed by them was at least moderate. If vasodilatation is not so high, peripheral resistance will not decrease significantly. In that case diastolic pressure will remain unchanged. In the present study we observed no significant change in diastolic blood pressure of our female volunteers which indicates the level of exercise was light as the rate of jogging was slow in comparison of that of male counterparts.

Our study indicates that submaximal exercise causes moderate increase in systolic blood pressure in both male and female subjects whereas diastolic blood pressure may decrease slightly or remain unchanged.

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