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LETTER TO THE EDITOR

ANAEROBIC POWER AND CARDIORESPIRATORY EVALUATION IN UNTRAINED MALES (18–19 YEARS)

Sir,

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Exercise is a stressful condition which produces a marked change in body function specially cardiovascular, respiratory and nervous activity. It has been a means of finding out the physical capabilities and physiological responces of an individual (1). We undertook a study to investigate cardiovascular and respiratory responces to graded exercise in untrained male subjects. Graded exercise on a mechanically braked bicycle ergograph was chosen, since progressive workloads can be interspersed with short rest periods, thus giving the subjects time to recover before starting next period of exercise (2). The ability to develop power by utilization of the phosphogen system was tested by the vertical jump reach exercise which is a reliable and practical test for determining power of lower extremities (3). This study aims to provide a reference data which may serve as a guide for careful monitoring during an exercise procedure. Also anaerobic power testing can be used as a predicting of track and field abilities.

Fifty normal and healthy male medical students (18–19 years) were selected after detailed history and physical examination. Subject rested in supine position for 15 mins before the start of exercise. They were told to repot immediately if they felt any discomfort, fatigue or dizziness. In most of the subjects maximal load at which subjects would cycle on the bicycle ergograph was found to be 5 kg with a heart rate of 198 beats/min. The submaximal load which should be withen 85–90% of the maximal heart rate at maximal load i.e. in between 168–178 beats/min (4, 5) was found out to be 4 kg after repeatitive testing. For two sessions of graded exercise the recommended load is 2 kg and 4 kg respectively, corresponding to heart rates of 130 and 170 beats/min (4). After rest of 15 minutes subjects performed two sessions of graded exercise each lasting for 5 minutes with a rest of 15 minutes in between, on a mechanically braked bicycle ergograph. Pedalling rate was 60 revolutions minute, since at this rate there is lowest 02 uptake and greatest mechanical efficiency. B. P. was measured with a mercurial sphygmomanometer, pulse rate was examined by palpatory method and respiratory rate visually. Parameters recorded just after the 5th minute in both the sessions were termed as S1 and S2. Before start and 15 minutes after both the exercise, session were designated as R1, R2 and RA respectively. Anaerobic power was found out by the Sargent jump reach test (6). A plywood board 2 feet x 5 feet painted flat black with markings of yellow lines for measurements of height was used. It was attached firmly to the wall, chalk was placed on the fingertips of dominant hand, the subjects faces the board, and mark a point on the board without raising his heels. Next a jump is made straight forward and another point is marked. The score to be recorded is the difference between the reaching height and the jumping height i. e. "D". Three trials were allowed and scored to the nearest 'quarter' inch. In order to make the jumps reach test more valid as a measure of leg power the Lewis nomogram was used. Also the readings were tallied with a equation given by the side of nomogram. P = 4.9 x Weight x "D" where P = power in kg/sec. The means and S. Ds were calculated for all observations and statistical significance was found out using 't' test.

The results of the present study are shown in Table I, II, and III respectively. In this study, heart rate increased linearly with increasing grades of exercise which could be due to sympathetic stimulation, increased

TABLE I: Cardiorespiratory paramter.

Sr. No.	Parameter	Session–I At Rest (R1) Mean Range	Session–I After Session–I (S1) Mean Range	Session–II At Rest (R2) Mean Range	Session–II After Session–II (S2) Mean Range	15 minutes after Session–II (RA) Mean Range
1	Heart rate (beats/min)	71.8 (68–80)	134.9 (126–146)	80.2 (70–80)	175.3 (168–180)	132.7 (180–150)
2	B.P systolic in mm of Hg	110.6 (90–120)	122.6 (110–130)	111.8 (100–122)	142 130–160	121.1 90–140
3	B.P diastolic in mm of Hg	75.4 60–80	69.5 60–80	75.6 60–82	63.6 50–80	73 70–80
4	Respiratory rate/min	15.4 14–18	24.72 20–30	16.52 14–18	32.48 26–38	25.4 20–30

TABLE II: Double product (DP) and mean arterial pressure (MAP) values.

Sr. No.	Parameter	Resting	Session–I	Resting after Session–I	Session–II	Recovery
01	D.P	7580.4	15579	84.52	23933.2	15148
02	MAP (mean)	91	94.2	92.9	101	97

D.P: Increases with increasing grades of exercise & MAP shows negligible difference.

TABLE III: Anaerobic power and comparision with body wt. and body surface area (BSA) in subject under study.

Sr. No.	Age	Anaerobic power	Body wt.	B.S.A in sqm
01	18 years	70.2±0.92	55.36±0.263	1.16±0.016
02	19 years	69±1.97	54±1.14	1.17±0.0072*

*Not significant

venous return and withdrawal of parasympathetic stimulation.

Statistically significant increase heart rate over the pre-exercise values were observed during both the exercise sessions. Also there was persistent increase in heart rate even after rest of 15 minutes following the second session. This could be due to sustained release of catecholamines (7, 8) during submaximal exercise in untrained subjects. There was rise in systolic blood pressure linearly with increasing grades of exercise and the result is statistically significant (9). Decrease in systolic blood pressure during recovery is to due a decrease in cardiac out put. Decrease in diastolic blood pressure in both the session of exercise may be due to epinephrine acting on vascular B2 receptors, as double product of heart rate and systolic BP, also called as myocardial-tension-time index (M.T.T.I.) gives an idea of myocardial O2 consumption. It showed a linear increment and being index of myocardial O2 consumption, showed a gradual fall during recovery. Respiratory rate increased in both the session of exercise which could be due to a rapid neurogenic component and slower humoral component of exercise hypernea.

Anaerobic power which is assessing capacity to perform severe exercise of short duration was found to be lower with 19 years subjects which possibly could be due to lack of motivation. This study also reveals a direct relationship between body weight and anaerobic power (Table III). Our knowledge regarding anaerobic power and its relation with different factors is inadequate. Further studies are required in this regard.

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