Predicting the Time of 1500 Meters Run Through Following the Guidelines of Harvard Step Test

E.A. Elsisi

Department of Athletics, Faculty of Physical Education, Menoufiya University, Sadat, Egypt

Abstract: The purpose of this study was to recognize the relationship between the pulse rate in the Harvard step test and the pulse rate in 1500 meters run and predict the time of 1500 meters run through following the guidelines of the Harvard step test by using a prediction equation. 4 males, 17-20 years old, from the 1500 meters racers participated in this study. The study group wears the buller-hour when they ran 1500 meters to count the pulse rate every five seconds till the end of the race. After the completion of the race and after having an adequate time for rest, the athletes perform the Harvard step test to measure the pulse rate each five seconds during the test performance till the end of the test. The results showed that there was a coefficient correlation between the pulse rate in 1500 meters run and the pulse rate of the Harvard step test as the value of the calculated coefficient correlation is greater than the spreadsheet. This can help the coaches to predict the time of 1500 meters run through using the predicting equation.

Key words: Pulse rate % Harvard step test % Predicting

INTRODUCTION

The ideal middle distance runner is characterized by the speed of the short-distance runner and the endurance of the long-distance runner. Abd El-Rahman [1] pointed out that the middle distance runner understands how to distribute his effort not only according to his ability to produce energy but also on the way his opponent distributes this energy. William [2] stated that at the elite level, the 800 meter race requires about 70% anaerobic endurance to 30% aerobic while the 1500 meters race requires about a fifty-fifty mixture of aerobic and anaerobic. Allawi and Abd El-Fattah [3] pointed out that the athlete in the 1500 meters race depends on the preparation of the largest bulk of the energy source adenosine tri phosphate through the anaerobic system during running at the beginning and the end of the race. It is known that the largest source of support to rebuild the adenosine tri phosphate is in the middle section of the race distance that depends on the aerobic system. Adelizi [4] declared that developing the special endurance for middle-distance races should be performed at distances between 200-1600 meters run by speed of the race. Endurance according to Edward [5] refers to exercise programs consisting of prolonged usually continuous work bouts of relatively low intensity. To know the time of 1500 meters run, the athlete must run the whole race and this leads to fatigue especially through the competitions. Al-Bek [6] pointed out that the continuing muscular activity lead to a decrease in the effort and the occurrence of the fatigue phenomenon especially during competitions and this in turn leads to the occurrence of movement involving other muscle groups. Thus, it was necessary to look for a method which helps to predict the time of 1500 meters run without having the athlete to run the race distance, especially before the competition. Edward [7] points out that today more than ever before it is necessary for coaches, trainers and fitness instructors to recognize the vital part physiology laboratories play in the successful conduct of physical education, athletic and activity programs and over the past 30 years the number of physiology laboratories has increased tremendously.

Salama [8] confirms that as a result of the development of sport physiology a great progress has been recently made in improving the methods of measurement, such as using tools and modern equipments that measure the various changes which occur in the body at the rest time and during the physical effort performance. This can occur in the measurement laboratory, stadiums or in the sports

Corresponding Author: E.A. Elsisi, Department of Athletics, Faculty of Physical Education, Menoufiya University, Sadat, Egypt

halls that lead to the improvements on the evaluation methods of the physical efficiency for athletes. The researcher used a field test which named the Harvard step test that is available to the coach and the athlete in order to help them to predict the time of 1500 meters run without having the athlete to run the race distance.

MATERIALS AND METHODS

The present study adopted the descriptive approach. Four males out of 1500 meters racers participated in the study. Their ages were between 17and 20 years. Some measurements of the study sample such as age, height, weight, ages of training, the pulse rate of 1500 meters run and the pulse rate of the Harvard step test have been taken to know the homogeneity of the study sample. The athletes wore a buller-hour when they ran 1500 meters race in order to count the pulse rate every five seconds till the end of the race. After the completion of the race and after having an adequate time for rest the athlete proceeds to perform the Harvard step-test. The athletes wore the buller-hour to measure the pulse rate each five seconds during the test performance. The athlete steps up and down the box 30 steps per minute. This was determined by setting the metronome to beat at a rate of 96 beats per minute. The athlete continues to perform the activity accompanied by rhythm for about five minutes.

Harvard step test is used to measure the body's ability to adapt to the work and the duties of physical labor and speed of the recovery from the effort. The idea of the test is that the person performs the physical effort for five minutes on a box step and at the end of the five minutes; the coach measures the heart rate. The tools used in this study were a wooden bench (20 inches height, 16 inches long and 14 inches width and a stop hour and metronome device to regulate the rhythm of stepping. Method of performance: the person stands confronting the wooden seat and when he is given the sign to start, he starts to climb and land on the wooden bench at the level of 30 steps per minute maintaining the body straight during climbing and landing on the seat. The person continues to climb and land on the seat at an average of 30 times per minute continued non-stop for five minutes. After completing the test, the person sits on a chair and the pulse rate in five minutes is calculated [9].

RESULTS AND DISCUSSION

Table 1 shows the homogeneity of the study sample in the growth variables that include age, height, weight and ages of training as the skewness coefficient for growth variables was limited between ±3 which shows the moderation of the sample distribution.

Table 2 displays the homogeneity of the study sample in the pulse rate for 1500 meters run as the skewness coefficient was limited between ±3 which indicates the moderation of the sample's distribution.

Table 3 displays the homogeneity of the study sample in the pulse rate for the Harvard step test as the skewness coefficient was limited between ± 3 which indicates the moderation of the society distribution.

Table 4 displays the coefficient correlation between the pulse rate in 1500 meters run and the pulse rate of the Harvard step test as the value of coefficient correlation calculated is greater than the spreadsheet.

Table 5 shows the variable of Harvard pulse contributors at the time of 1500 meters run where the value of calculated significant differences between two means is greater than the spreadsheet.

Table 6 displays that the coaches and trainers can predict the time of 1500 meters run. This can be computed using the following equation:

- C Time of 1500 meters run = quantity fixed + regression coefficient (The degree of independent variable).
- C Time of 1500 meters run = - 0.040 + 0.032 × Harvard pulse.

The present study revealed as shown in Table 4 that there is a statistically significant relationship between the pulse rate in 1500 meters run and that of Harvard, where the coefficient correlation was 0.977 at the 0.05 levels of significance as the value of calculated coefficient correlation is greater than the spreadsheet. This refers to the possibility of using the extracted pulse from Harvard's test to predict the time of 1500 meters run. That the Harvard step test can be used to measure endurance in running on the treadmill device and measuring respiration and fitness which require the muscles effort and the ability to recover from this effort. This is related to the characteristics of middle distance races especially 1500 meters run. The endurance and the levels of achievement in these races depend mainly on having the characteristics of the physical endurance and the efficiency of the circulatory and respiratory system.

Table 1: Description of the study sample

Variables	The unit of measure	Mean	Median	Standard deviation	Skewness coefficient
Age	Year	19..500	19..5	1..291	0.000
Height	Centimeters	171..250	174	56.175	- 0.147
Weight	Kilogram	65.000	69	8.718	-1..376
Age of training	Year	5. 250	4	3..304	1.135

The skewness coefficient was limited between ± 3

Table 2: Mean, median, standard deviation and skewness coefficient of the study sample in the pulse rate for the 1500 meters run

Time	Mean	Median	Standard deviation	Skewness coefficient
5 minutes	188. 146	194..250	16..352	- 1.120

The skewness coefficient was limited between ±3

Table 3: Mean, median, standard deviation and skewness coefficient of the study sample in the pulse rate of the Harvard step- test

Time	Mean	Median	Standard deviation	Skewness coefficient
5 minutes	151.671	154. 375	8..387	- 0. 967

The skewness coefficient was limited between ±3

Table 4: The coefficient correlation between the pulse rate in 1500 meters run and the pulse rate in Harvard step test

1500 pulse		Harvard pulse			
Mean	Standard deviation	Mean	Standard deviation	Difference average	Coefficient correlation
188.146	22.424	151.671	8..387	36.475	0..977*

The value of coefficient correlation at the 0.05 significant level and degree of freedom 2=0.950

Table 5: Variable of Harvard pulse contributor at the time of 1500 meters run

Variables	Coefficient correlation	The degree of freedom	Regression coefficient	The margin of error	Significant differences between the two means	Discrepancy between two measures	The fixed quantity	The percentage of contribution
Harvard Pulse	0..977	2	0.0316	0.007	4.8	23.044	- 0.04	92%

The value of significant differences between the two means at the 0.05 significant level and degree of freedom 6=2.447

Table 6: Predicting the time of 1500 meters by Harvard's pulse

Pulse	144	149	154	159	164	169	174	179	184	189	194	199	204
Time of 1500 meters	4..56	4.72	4.88	5.04	5..20	5..36	5..52	5.68	5.84	6.00	6.16	6..32	6.48

Also, the results shown in Table 5 indicated that one can predict the time of 1500 meters run through the prediction equation which was elaborated previously in the results. The results shown in Table 6 indicated that using the the prediction equation by the extracted pulse from Harvard step test after the performance and this can help the coaches and trainers to obtain the time of 1500 meters run without having the athletes to run the race distance especially before the competitions.

CONCULSION

There is a relationship correlation with statistical significance between the pulse rate in the 1500 meters run and the pulse rate of Harvard step test. The coaches and trainers can predict the time of 1500 meters run through following the guidelines of the Harvard step test by using an equation to predict.

REFERENCES

1. Abd El-Rahman, A., 1986. Science Associated with the track and field competitions. Dar Al-Maaref, Cairo, Egypt, pp: 238.
2. William, J. and H. William, 1991. High performance training for track and field. Middle distances. Human Kinetics Publishers, United States of America, pp: 85-98.
3. Allawi, M. and A. Abd El-Fattah, 1987. Physiology sports training. Dar Al-Maaref, Cairo, Egypt, pp: 364.

4. Adelizi, D., 1992. Cross country distance training track and field. Quarterly review, Pairs, pp: 17.

5. Edward, L., 1984. Sport's physiology. Sprint and endurance training: methods and effects. Library of Congress, United States of America, pp: 202-247.

6. Al-Bek, A., 1987. Planning sports training knowledge. Dar Al-Maaref, Alexandria , Egypt, pp: 26.

7. Edward, L., 1993. The physiological basis for exercise and sports. Introduction to sports medicine exercise physiology and kinesiology. Birmingham university, England, pp: 2-9.

8. Salama, B., 2000. Physiology of Sport and physical performance. Dar Al-Fikr Al-Arabi, Cairo, Egypt, pp: 23.

9. Radwan, A., 1998. Methods of measuring physical effort in sports.The Book Center Publishing House, Cairo, Egypt, pp: 282.