ANAEROBIC PERFORMANCE ATTRIBUTES OF MALE SPRINTERS AND JUMPERS

GRACE O. AKINTUNDE (MRS OTINWA)
LAGOS STATE COLLEGE OF EDUCATION,
OTO-IJANIKIN, LAGOS

ABSTRACT

This is a comparative study of the Anaerobic performance Attributes of University of Ibadan athletes comprising ten male sprinters and ten male jumpers. The subjects were compared using variables such as height, weight, lower limb length, leg muscle strength, maximum anaerobic power capacity and fatigue index.

The purpose of the study was to find out if significant differences exist in the anaerobic performance attributes among Sprinters and Jumpers.

The descriptive statistics used were mean, standard deviation and Range. The Inferential statistics used was the 'T' test, which was held significant at 0.05 level.

Results indicated that significant differences existed in the maximum Anaerobic power Anaerobic capacities among sprinters and Jumpers, while there was no significant difference in height, weight, leg muscle strength and fatigue index.

INTRODUCTION:

The Biological and social nature of human beings have made it necessary for mankind to engage in one form of physical activity or another from birth to death (Amusa and Udoh, 1982). The participation at various levels has been the pre-occupation of people.

Sprints and jumps which are important sport events have gained recognition and attracted many spectators. As an International Sports, they cannot be ignored due to their popularity. Sprint such as 100m, 200m, 400m and Hurdling require explosive speed, quick reaction time, strength flexibility and the ability to perform without the use of oxygen. Likewise, jumps such as long jump, high jump and tripple jump also require speed, height, flexibility, co-ordination and ability to perform without the use of oxygen.

In elite sport performance, the ultimate concern is with the final performance whether such performance occurs in sprinting, jumping or any other sports. The final out-put observed however is dependent upon a complexity of factors, each of which may contribute a variable amount to the performance. One of the important factors is the anaerobic condition of the sport. This condition occurs when oxygen is not at the disposal of the cell. This inturn influences the capacity and power of the performer (Astrand and Rodahl, 1977).

The regeneration of muscle ATP through anaerobic mechanism is an essential feature in sports of short but intense duration. This area of exercise physiology has been characterized by dramatic advances over the past fifty years. The development in the late sixties of the muscle biopsy techniques as applied to physical work and performance has helped to clarify many of the mechanisms involved in anaerobic energy production.

Tests that could be carried out to assess anaerobic power, capacity and index fatigue of athletes involved varying degrees of sophistication of leg cycle Ergometers, and paddling Ergometers (Macdougall, 1982).

This study is therefore designed to compare and to find out if significant differences exist in the height, weight, lower limb length, leg muscle strength and the leg anaerobic power, anaerobic capacity and fatigue index of male sprinters and jumpers. and jumpers at University of Ibadan.

METHODS AND PROCEDURES

Male sprinters (n = 10) and jumpers (n = 10) that represent the University of Ibadan in Athletics competitions were used for the study. The age range was between 18-28 years. Informed consent was sought from the subjects.

A breakdown revealed that, 400m runners (n = 3) 200m runners (n = 2) 100m runners (n = 4) one hurdler, triple jumpers, (n = 3) long jumpers (n = 4) and high jumpers (n = 3) participated in the study.

TEST PROTOCOL

HEIGHT AND WEIGHT: Height and weight of each subject were measured using the Health -o- meter scale with the subjects dressed in sports-wear and without shoes.

LOWER LIMB LENGTH: A tape measure was used to measure the lower limb length. This was measured from the fronchantelon to the foot on each side of the body.

LEG MUSCLE STRENGTH: The back and leg dynamometer was used to determine the leg muscle strength of the subjects. Subject stood at the base with the knees flexed while head and back of subjects were held straight. The hands were held straight. The hands were used to support the handle so as to maintain it in a static position. Subjects then stood up forcefully. The new position of the dynamometer pointer was recorded to the nearest 0.1kg. Three trials were allowed and the best recorded.

ANAEROBIC POWER, CAPACITY AND FATIGUE CURVE

The Wingate anaerobic 30 seconds test was used to determine the maximal leg anaerobic power, capacity and fatigue curve (Bar-Or, 1978). The subject warmed up by riding the bicycle as the predetermined resistance was set. At the command "start," the subject pedalled at maximal speed in an attempt to complete as many revolutions as possible in 30 seconds.

The following formula were used to compute the leg anaerobic power, capacity and fatigue index from the Number of revolutions made at each five second interval of the 30 seconds.

i) Maximal leg anaerobic power = kp setting x highest number of revolutions x 6 (-kg - m/5 seconds).

ii) Leg Anaerobic capacity - kg setting x total number of revolution x 6 (kg - m/30 seconds)

iii) Fatigue index - Highest power out-put minus of lower power out divided by the elapsed time (Bar-Or, 1982)

RESULTS AND DISCUSSION

The results obtained in this study is presented in Table 1.

The mean height for sprinters was 177.60cm ± 4.74 with a range of 15cm while that of the jumpers was 176.76cm ± 3.69 with a range of 12.5cm. The sprinters had a slightly higher mean value than the jumpers. These were not significantly different. These mean

values were found to be lower that the mean height of athletes at Tokyo Olympics where sprinters had a mean of height of 198.4cm and jumpers, 181cm.

TABLE 1

VARIABLES	SPRINTERS (N = 10)			JUMPERS (N = 10)			t VALUES (DF 18)
	MEAN	± SD	RANGE	MEAN	± SD	RANGE	
Weight (Kilogram)	68.89	3.94	11.9	67.55kg	3.64	11.5	0.79
Height (cm)	177.60 cm	4.74	15	176.76	3.69	12.5	0.44
Lower Limb length (cm)	95.00	2.05	6	99.70	8.91	27	-1.63
Leg muscle Strength (kg)	104.00	45.94	113	110.40	35.03	96	0.35
MAP (kg-m/30sec)	226.86	61.50	133.5	225.75	22.63	70.5	1.98*
AC (kg-m/30sec)	1256.50	256.99	751	1015.45	136.04	210	2.62*
Fatigue Index	6.19	2.85	8	5.26	1.47	3.72	1.09

t value 1.734. Significant at 0.05 level

* Significant

MAP — Maximum Anaerobic Power

AC — Anaerobic Capacity

The mean body weight of sprinters was 68.89kg ± 3.94 with a range of 11.9 while that of the jumpers was 67.55kg ± 3.64 with a range of 11.5. These are not significantly different. Their mean values were lower than the mean value of 74.6kg of Nigeria Track & Field athletes for the 1988 Seoul Olympics (Amusa and Igbanugo, 1989).

The mean value of the lower limb length of sprinters was 95.00cm ± 2.05 with a range of 6cm while the mean of jumpers was 99.70cm ± 8.91 with a range of 27cm. The jumpers had a longer lower limb length than the sprinters but the difference was not significant.

The mean for leg muscle strength for sprinters was 104.0kg ± 49.94 with a range of 113kg. While that of the jumpers was 110.40 ± 35.03 with a range of 96kg. These mean values were lower than the one obtained by Akeredolu (1987) on Oyo State track athletes which was 122.6kg.

The mean values for maximum anaerobic power of sprinters was 226.86kg m/ second ± 61.50 with a range of 113.5kg - m/ second while that of the jumpers was 225.7kg - m/

second ± 22.63 with a range of 70.5kg - m/ second. These mean values were significantly lower than the mean value of 335.8kg - m/5 seconds of the Nigeria Track and field athletes for the Seoul '88 Olympics (Amusa and Igbanugbo, 1988).

Anaerobic Capacity: The mean anaerobic capacity for sprinters was 1256.50kg-m/-30second ± 256.99 with a range of 751kg -m/30 second while that of the jumpers was 1015kg -m/30second ± 136.04 with a range of 210kg - m/30 second. These were significantly different. These mean values were lower than the mean value of 1615.8kg - m/30 seconds obtained by the Nigerian Track and field athletes of Seoul Olympic.

Fatigue Curve: The mean value for sprinters in fatigue curve was 6.19 ± 2.85 with a range of 8 while the mean value for the jumpers was 5.25 ± 1.47 with a range of 1.09. These were not significantly different. These mean values were lower than the mean value of 7.3 as recorded by Nigeria Track Field athletes of the Seoul '88 Olympics.

The results of the study revealed that there was no significant difference in the height (ii) body weight (iii) lower limb length and (iv) leg muscle strength of sprinters and jumpers. Though, all the values obtained were lower than the criferion referenced.

The anaerobic performance attributes showed that there was a significant difference in the leg alactacid anaerobic power and capacity of sprinters and jumpers. There was, however no significant difference in the fatigue index of sprinters and jumpers. The significant difference may be as a result of increased muscle-store of ATP, CP and glycogen, increased capability to utilize these stores through the enhanced glycolytic enzyme activities of the sprinters. (Arstila and Rusko, 1976).

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