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An analytical study of aerobic endurance among middle distance runners and long distance runners of Meerut district

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Abstract

The purpose of the present study was to study the difference in aerobic endurance among Middle distance Runners and Long distance runners of Meerut District. The 20 Male Middle distance runner and 20 Male long distance Runners of Meerut District those who are doing regular athletic practice were taken for the study. The 12 Run Cooper Test were used to evaluate the aerobic endurance among Middle distance Runners and Long distance runners. The Middle distance runners are of 800 M and 1500 M and Long distance Runners are of 5000 M and 10000 M. The Study shows that the middle distance runners are having very good aerobic endurance compare to the long distance runners because the 12 Min cooper Test it is very efficient to perform well for middle distance runners. It is recommended that middle distance and long distance runners must be given good endurance training to perform well in the middle and long distance events.

Keywords: Aerobic endurance, athletic, runners, middle distance, long distance etc.

Introduction

Aerobic Endurance is the amount of oxygen intake during exercise. Aerobic Endurance is the time which you can exercise, without producing lactic acid in your muscles. During aerobic (with oxygen) work, the body is working at a level that the demands for oxygen and fuel can be meet by the body's intake. The only waste products formed are carbon-dioxide and water which are removed by sweating and breathing.

Aerobic endurance can be sub-divided as follows:

- Short aerobic – 2 minutes to 8 minutes (lactic/aerobic)
- Medium aerobic – 8 minutes to 30 minutes (mainly aerobic)
- Long aerobic – 30 minutes + (aerobic)

Middle distance events generally include the 800 M, 1000 M, 1500M, One Mile Run and 2000M. Competitors do not use starting blocks. Runners may not touch the ground with their hands at the start. In the 800 M starting positions are staggered to equalize the length of each lane on the curved track. Runners must remain in their lanes until the end of the first turn. Aerobic endurance is important in all middle distance events, as is strategy as runners must conserve some energy in order to finish strong.

Middle Distance Running Technique

Middle distance covers the 800 metres and 1500 metres track events. Comparing past and present world record-holders, it would appear that 800 metres and 1500 metres male athletes are most likely to peak around the age of 25 and female athletes at 27 years of age.

Guidance on the running technique of the middle-distance runner is provided in the form of a series of pictures and associated notes that highlight the main technical points.

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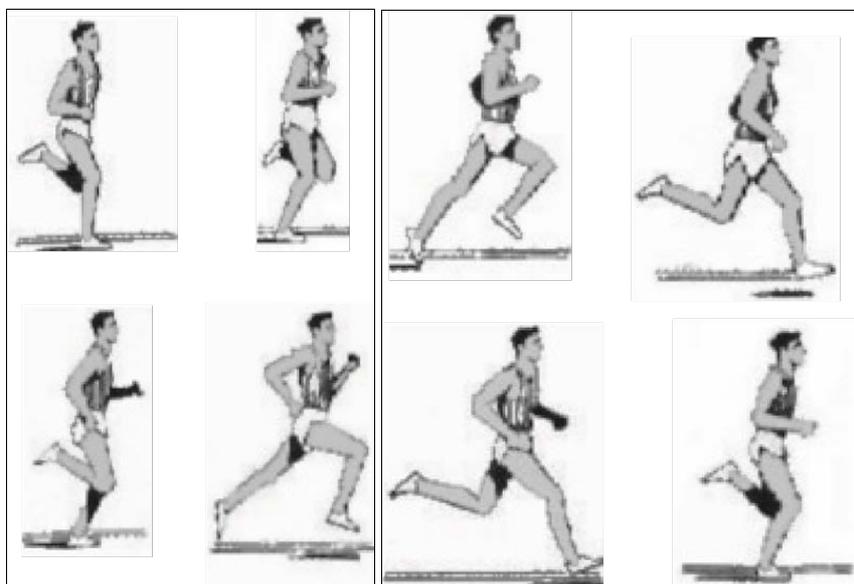


Fig 1: Middle Distance Running Technique

The foot strikes the ground below the centre of gravity (which is around the central area of the hips) the strike is slightly on the outside of the foot and from the ball of the foot to the mid-foot. There is then a roll across and a dropping of the heel. The leg's role is supporting and driving.

As the foot strikes the ground there is also some flexion in the knee. This should not be too excessive, so leg strength must be developed to ensure stability in and around the knee. There is also some movement around the hip girdle. This can be excessive, so strength exercises for the whole region, especially the abdominal and lower back, are required. This region must be kept stable, thus giving a strong platform from which to drive.

As the torso moves ahead of the foot, the drive is initiated and the Achilles and calf are placed under great stress. It is therefore important that stretching and strengthening of this area be incorporated into training. Muscle fibers in the calf respond to a reflex action as they are placed in a full stretch and contract quickly, thus apparently straightening the foot, forcing the athlete to back up higher on their forefoot. (This makes the foot a further lever, often forgotten by many runners). The foot "grips" the ground as the torso moves ahead, forcing the leg into full extension. Once again, the strength and flexibility of the hamstrings are important.

After the athlete has reached almost full stretch, a reflex action occurs in the muscle fibers of the hamstring, quickly shortening it and pulling the foot up off the ground. This allows the whole of the limb to swing back a bit further. Hip mobility and the ability to stretch the quads at the front of the leg are also vitally important.

The upper part of the leg is drawn forward by the action of the quads and hip flexors beginning to shorten. The foot continues on an upward curve, with the help of the contracting hamstring and the hinge effect of the knee joint. It swings into the gluteus maximus (backside), so shortening the lever and making it easier to bring forward.

The thigh continues forward and swings upwards, the head of the foot drops from its high point and accelerates downwards and forwards. The knee reaches its high point, which is not quite as high as that of a sprinter (i.e., at an angle of around 90 degrees to the rear leg).

The foot ends its swing through at a point just ahead of the knee. The leg maintains a slight angle at the knee (the leg is not straight). Having reached its high point, the thigh starts a

downward swing; this initiates an acceleration of the foot backwards.

The foot once again strikes the floor in a backward motion, adding to the athlete's forward movement.

General Notes

- There is a very slight "rolling" of the shoulders as the arms keep the body balanced with a pumping action
- The shoulder joint should be very supple so that as the arm swings through it do not pull them up too much
- The shoulder girdle and the hip girdle twist slightly in opposite directions, counterbalancing each other
- The arms do not work too hard and work with the diagonally opposite leg
- The arm should swing loosely by the side and should be bent at around 90 degrees. As the arm swings back, there is little or no straightening
- Hands are held in a very relaxed "fist" with the thumb resting on the forefinger
- The thumb should be uppermost, and the elbows hang close but comfortably into the side of the body
- The body is held upright with the back relaxed but straight with minimal forward lean

Coaches

Note the physical requirements (bold text) identified in the Running Action section above and plan appropriate training sessions into the athlete's training program to develop them.

As you monitor the athlete's technique, look primarily for a Smooth and Relaxed action.

5000 M and 10000 M Run are the long distance track events which require runners to balance their energy. These types of races are predominantly aerobic in nature and at the highest level, exception levels of aerobic endurance is required more than anything else. Elite long distance athletes typically train over 100 miles a week.

Long Distance Running Technique

Guidance on the running technique of the long distance runner is provided in the form of a series of pictures and associated notes that highlight the main technical points.

The foot strikes the ground below the centre of gravity (which is around the central area of the hips) the strike is slightly on the outside of the heel of the foot and the forward movement

is then down the outside of the sole onto the ball of the foot. The leg's role is supporting and driving.

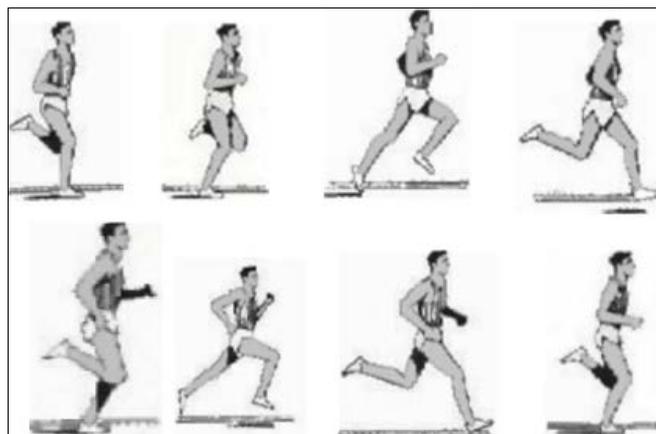


Fig 2: Long Distance Running Technique

As the foot strikes the ground there is also some flexion in the knee. This should not be too excessive so leg strength must be developed to ensure stability in and around the knee. There is also some movement around the hip girdle. This can be excessive, so strength exercises for the whole region, especially abdominal and lower back are required. It is very important that this region is kept stable thus giving a strong platform from which to drive.

As the torso moves ahead of the foot, the drive is initiated and the Achilles and calf are placed under great stress. It is therefore important that stretching and strengthening of this area is incorporated into training. Muscle fibers in the calf respond to a reflex action as they are placed in near full stretch and contract quickly, thus apparently straightening the foot, forcing the athlete back up higher on their fore-foot. (This makes the foot a further lever, often forgotten by many runners). The foot "grips" the ground as the torso moves ahead, forcing the leg into full extension. Once again, strength and flexibility of the hamstrings are important.

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The foot once again strikes the floor in a backward motion, adding to the athlete's forward motion.

Kenenisa Bekele of Ethiopia is an Ethiopian long-distance runners who holds the World record and Olympic Record in both the 5000 Meters and 10,000 Meters. He is the reigning Olympic Champion over 5000 Meters and 10000 Meters and the most accomplished runner with six IAAF World Cross Country Championships titles in 12 KM Run and five IAAF World Cross Country Championships titles in 4 KM run.

Aim

To find out the Aerobic Endurance between Male Middle distance runners and Male Long distance runners.

Sample

The sample for present study consists of 20 Male Middle distance Runners and 20 Male Long distance runners of Meerut District.

Tools

12 Minute Cooper Test is used for collection of Data.

Procedure of data collection

The Cooper test is a test of physical fitness. It was designed by Kenneth H. Cooper in 1968 for US military used in the original form, the point of the test is to run as far as possible within 12 minutes.

To undertake this test you will require:

- 400 meter track
- Stopwatch
- Whistle
- Technical Official

Methods of conducting the test

This test requires the Middle distance runners and Long distance runners to run as far as possible in 12 minutes.

- The subjects given 10 minutes for warm up.
- The assistant gives the command "GO", starts the stopwatch and the athlete commences the test
- The Technical Official keeps the athlete informed of the remaining time at the end of each lap (400m)
- The Technical Official blows the whistle when the 12 minutes has elapsed and records the distance the athlete covered to the nearest 10 meters

Results and Discussion

Table 1: showing the Mean, S.D, Standard Error, t-ratio of Middle distance runners and Long distance runners in Cooper Test.

| Results of 12 min Cooper Test | N | Mean | Std. Deviation | Std. Error Mean | t | df | Sig. (2-tailed) |
|-------------------------------|----|---------|----------------|-----------------|---------|-------|-----------------|
| Middle distance runners | 20 | 3340.00 | 219.71 | 49.13 | 1.69453 | 38.00 | 0.10 |
| Long distance runners | 20 | 3240.00 | 137.71 | 30.79 | | | |

The Middle distance runners Mean Performance is 3,340 Meters and the long distance runners mean performance is 3240 Meters. There is mean difference of 100 Meters between Middle distance runners and Long distance runners. The middle distance runners are very good compare to long

distance runners. The S.D. of Middle Distance Runners are 219.71 and Long distance runners 137.71 and standard error of middle distance runners is 49.13 and long distance runners are 30.79 and t-ratio is 1.69. Hence it is concluded that middle distance runners are good in aerobic endurance than long

distance runners.

Recommendations

- It is recommended that good Aerobic Endurance must be given to middle distance runners and long distance runners.
- It is recommended that similar studies can be conducted in any sports and games.

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