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## **Evaluation of Anaerobic Threshold among Football Players Using Rast and 300 Yard Shuttle Test: A Cross Sectional Explorative Design**

**J. J Anetha Johnson<sup>1</sup>, M. Sivashankaran<sup>2</sup>**

<sup>1</sup>MPT (Cardio.), <sup>2</sup>(BPT Student)

**Karlos Sports Science**

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### **INTRODUCTION:**

•"Anaerobic metabolism" refers to metabolic procedure that recycle ATP and produce a variety of by products but do not utilize O<sub>2</sub> as a terminal substrate (Webster et.al 1977). Anaerobic threshold (AnT) is the maximum sustained intensity of exercise for which measurement of oxygen uptake can full account for the energy required. (Krista svedakal et.al 2019)

•The projected total distance travelled in a football match normally varies between 10- 11km,with an energy output of 1500 kcal during active play (Della.A et al 2011)

•Anaerobic plays vital role in maintaining the endurance level of players throughout the 90 mins of the match it requires considerable utilization of both aerobic and anaerobic energy system to match the high energetic demands of the sport( Abdullah.F alghanna et.al 2012).

•Anaerobic Power is crucial in football as it enable players to perform high intensity activities such as sprinting, jumping, tackling, change of direction without consuming oxygen. Additionally it enable players to recover quickly & resist fatigue

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### **AIM OF THIS STUDY:**

The aim of this study is to measure an individual's ability to resist fatigue, agility level, and sustained performance during game with on-field assessments such as 300 Yard Shuttle Test and Running Based Anaerobic Sprint Test (RAST)

### **NEED OF THE STUDY:**

In addition to overall fitness, agility and other factors, football players need Anerobic evaluation for performance assessment, training program design, sports specific demands, injury prevention, and performance enhancement.

**OBJECTIVE OF THE STUDY:** To evaluate the anaerobic threshold among football players.

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### **MATERIALS & METHODOLOGY:**

Study Type - Cross-sectional Study Study Design - Explorative Design Sampling Method - Football Players Study Setting - Football ground

#### **INCLUSION CRITERIA-**

- Age group - Football players between 17-21 years old Gender- Male
- Able to respond to commands Players willing to participate

#### **EXCLUSION CRITERIA-**

- Any known medical history such as recent fractures, injuries, systemic illness Females
- Age group above 25



**Procedure:**

1. A football team (11 players) selected based on inclusion and exclusion criteria. Consent form given to players along with explaining testing methods. Players engaged in warmup for about 10-12 minutes.
2. Two types of on-field sprint based anaerobic and agility tests was carried out under supervision.

***RUNNING BASED ANAEROBIC SPRINT TEST (RAST)***

- 35 meters were measured and marked with cones in a straight track.
- Athletes are required to run six sprints of 35 meters in a straight track for about six times. In between each sprint, athletes were asked to rest for 10 seconds. The first assistant gave the orders “start” and “stop,” and each sprint time was recorded using a stopwatch. The second assistant kept a rest period of 10 seconds.
- We have recorded the duration of all six sprints by officiating a 10-second recovery time. Post-evaluation, athletes were advised to rest in a sitting position until their vitals stabilized.

***300 YARD SHUTTLE TEST:***

- Athletes should run sprint of 27.4 metres continuously for about 10 times in a straight track.
- At the beginning of the first sprint, the assistant issues the command "start" to start the stopwatch. At the end of the tenth sprint, the assistant issues the command "stop" to stop the stopwatch. The total amount of time required for 10 sprints was recorded.
- Like RAST, athletes are advised to take rest in sitting or lean backwards standing until their vitals stabilized.



**OUTCOME MEASURES:**

Time was noted for both the tests.

Using formula MAXIMUM POWER, MINIMUM POWER, AVERAGE

POWER, FATIGUE INDEX were calculated from through RAST.

## RESULTS:

### RUNNING BASED ANAEROBIC SPRINT TEST (RAST)

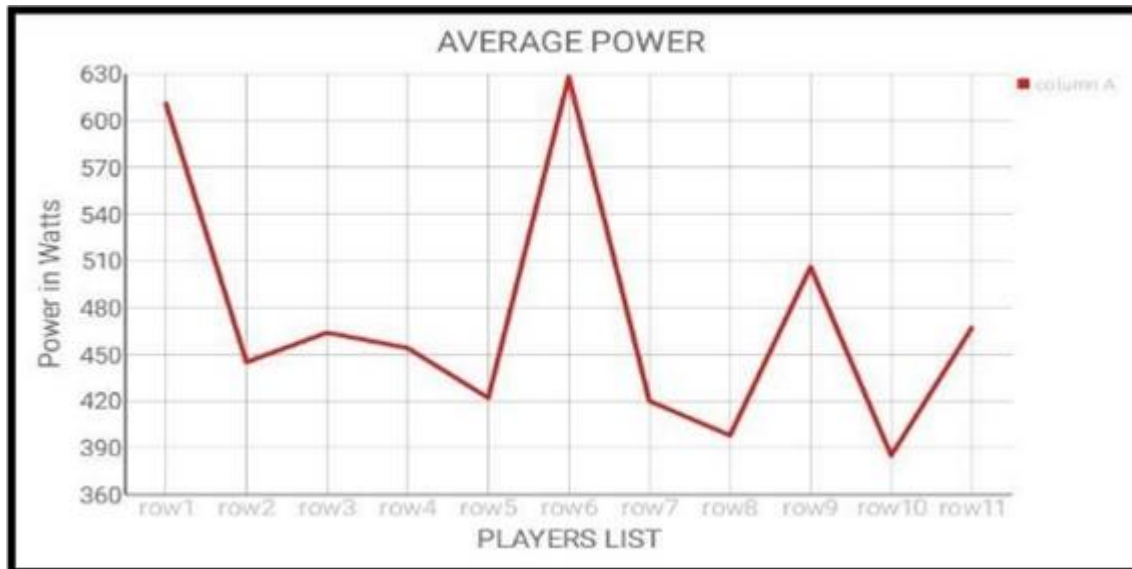
| PLAYERS | MAX POWER (Watts) | MIN POWER (Watts) | AVERAGE POWER (Watts) | FATIGUE INDEX (Watts/Sec) |
|---------|-------------------|-------------------|-----------------------|---------------------------|
| 1)      | 803               | 433               | 611                   | 13.8                      |
| 2)      | 509               | 372               | 445                   | 4.76                      |
| 3)      | 775               | 296               | 464                   | 16.3                      |
| 4)      | 686               | 314               | 454                   | 12.3                      |
| 5)      | 536               | 246               | 422                   | 9.56                      |
| 6)      | 808               | 497               | 628                   | 10.77                     |
| 7)      | 507               | 312               | 420                   | 6.39                      |
| 8)      | 651               | 249               | 398                   | 12                        |
| 9)      | 596               | 375               | 506                   | 7.86                      |
| 10)     | 554               | 304               | 385                   | 7.94                      |
| 11)     | 638               | 354               | 467                   | 9.75                      |

### 300 YARD SHUTTLE TEST

| PLAYERS | TIME     |
|---------|----------|
| 1)      | 59:59    |
| 2)      | 58:78    |
| 3)      | 59:42    |
| 4)      | 01:04:61 |
| 5)      | 01:04:92 |
| 6)      | 01:00:87 |
| 7)      | 01:04:57 |
| 8)      | 01:09:25 |
| 9)      | 58:59    |
| 10)     | 01:11:12 |
| 11)     | 01:03:28 |

### ARITHMETIC MEAN RESULTS

| MAX POWER | MIN POWER | AVG POWER | FATIGUE INDEX |
|-----------|-----------|-----------|---------------|
| 642.09    | 341.09    | 472.72    | 10.13         |



### DISCUSSION:

1. Suurmond et al. 2019 compared the RAST to the Yo-Yo Intermittent Recovery Test Level 2 (Yo-Yo IR2). This study found that RAST was a better predictor of RSA than the YO-YO IR2 based on its linear sprint feature, high reliability (0.95), and high specificity to football with the minimum duration to carry over the test (10 minutes). In this research, the RAST is also carried over with football players on a lonely track for less than 10 minutes.
2. The findings of this study correlate with the normative data and show that all the players at a poor level (>55 seconds), similar to Hoffmann et al. 2014 evaluated anaerobic threshold by using a 300-yard shuttle test in basketball players, and they fixed normative data for the 300-yard shuttle test.
3. Katheth Burgess et al. 2016 concluded that the RAST protocol was capable of accurately measuring anaerobic power and was a cost-effective measuring tool of anaerobic power. In this present study, the test was done using the anaerobic-based sprint test, which was cost-effective and highly beneficial.

### CONCLUSION:

Findings of this study can be used and forms basics for player specific exercises to meet individual excellence in football.

### LIMITATIONS AND RECOMMENDATIONS:

The evaluation process was only carried over with small population in this study.

This study may be extended in the following days to include strengthening and conditioning with the same football squad for roughly more than 3 months in the hopes of achieving better anaerobic capacity and greater performance level.

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