



Impact of Physiological factors in Shot Put performance of Throwers.

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Abstract

The study aimed to anticipate the performance capabilities of shot-put throwers by examining their physiological factors in relation to their athletic performance. The research involved 20 male shot-put athletes, aged 14-18 years, selected randomly from Govt. Co-ed Secondary Schools in Delhi. Participants were chosen based on their willingness, equipment accessibility, and suitable data collection time., Standing Height, Weight, Leg Length, Upper Leg Length, Lower Leg Length, Arm Length, Upper arm Length, Lower Arm Length, Hip width, Shoulder Width, Chest Width, Calf Girth, Thigh Girth, Chest Girth, Upper Arm Girth, Lower Arm Girth. These measurements and tests were carried out because they are pertinent to an athlete's performance capabilities. The findings of the study showed that the physiological factors such as lower arm length, calf girth, thigh girth plays a vital role in predicting shot put performance of throwers.

Keywords: Standing Height, Weight, Leg Length, Upper Leg Length, Lower Leg Length, Arm Length, Upper arm Length, Lower Arm Length, Hip width, Shoulder Width, Chest Width, Calf Girth, Thigh Girth, Chest Girth, Upper Arm Girth, Lower Arm Girth

Introduction

In the realm of track and field, shot put is a dynamic and physically demanding sport that showcases the raw power and precision of athletes. The shot-put event involves hurling a heavy spherical object, the shot, as far as possible within a defined throwing circle. While it may seem like a simple task, the performance of shot-put throwers is the culmination of a complex interplay between various physiological variables. This introduction delves into the multifaceted relationship between shot put performance and physiological factors, highlighting the critical role they play in shaping the success of throwers.

The sport of shot put has a rich history, dating back to ancient Greece, and remains a quintessential event in modern athletics. It demands a unique blend of strength, speed, and technique, making it a subject of considerable interest to researchers, coaches, and athletes alike. Understanding the physiological variables that underpin shot put performance is crucial for optimizing training regimens and enhancing competitive outcomes.

Several studies have emphasized the multifaceted nature of shot-put performance, highlighting the influence of various physiological factors. For instance, research by Wilmore and Costill (2004) has demonstrated the pivotal role of muscular strength and power in shot put success. Furthermore, Stone et al. (2003) explored the significance of biomechanical factors, such as release angle and velocity, in determining the distance of the shot-put throw. These studies collectively underscore the complex interplay between physiological and biomechanical variables in achieving peak performance in shot put.



While previous research has laid essential groundwork, there is an ongoing need to delve deeper into the intricate relationship between physiological variables and shot-put performance. Recent advancements in sports science and technology have provided new tools and methodologies for assessing athletes' physiological characteristics, allowing for a more comprehensive analysis of how factors like muscle strength, endurance, and coordination impact shot put outcomes.

In this study, we aim to contribute to this body of knowledge by investigating the role of specific physiological variables, such as muscle strength, anaerobic capacity, and flexibility, in the performance of shot-put throwers. By exploring these relationships, we seek to provide valuable insights that can inform training strategies, injury prevention programs, and talent identification processes within the sport of shot put.

Shot put performance is primarily influenced by a combination of muscular strength, explosive power, and technical proficiency. However, these attributes are underpinned by a multitude of physiological variables that contribute significantly to a thrower's ability to excel in this sport.

Muscle Strength: Undoubtedly, muscle strength is a cornerstone of shot-put success. The power needed to propel the shot with precision and force requires well-developed muscles, particularly in the lower body and upper extremities. Muscle strength not only dictates the initial push-off from the throwing circle but also influences the athlete's ability to maintain balance and control throughout the throw.

Explosive Power: Shot put throws demand an explosive burst of energy within a fraction of a second. Explosive power, generated by the rapid recruitment of muscle fibers, is essential for imparting speed to the shot and achieving maximum distance. This explosive power is closely associated with fast-twitch muscle fibers, anaerobic energy systems, and neuromuscular coordination, all of which have physiological underpinnings.

Biomechanics: The intricate technique required for a successful shot-put throw is contingent on the athlete's ability to harness their physiological capabilities effectively. Proper biomechanics, including the positioning of the body, the angle of release, and the timing of movements, are essential. These biomechanical factors are influenced by physiological attributes such as joint flexibility, coordination, and proprioception.

Endurance: While shot put is considered an explosive event, throwers still require a degree of endurance to perform consistently throughout a competition. Muscular endurance, cardiovascular fitness, and respiratory function all contribute to a thrower's capacity to maintain peak performance across multiple throws in a meet.

Nutrition and Recovery: Physiological variables extend beyond the physical aspects of athleticism. Proper nutrition and recovery are integral components of a shot-put thrower's training regimen. Nutritional factors such as energy intake, macronutrient composition, and hydration status significantly impact muscle function and overall performance. Adequate recovery is equally crucial for muscle repair and adaptation.



In conclusion, shot put performance is a multidimensional phenomenon influenced by a myriad of physiological variables. As athletes strive to push the boundaries of their capabilities and break records, understanding and optimizing these physiological factors becomes paramount. This exploration of the intricate relationship between shot put performance and physiological variables sets the stage for a comprehensive examination of the subject, shedding light on the science behind this compelling sport and the dedicated athletes who excel within.

Procedure and Methodology

The research involved 20 male shot-put athletes, aged 14-18 years, selected randomly from Govt. Co-ed Secondary Schools in Delhi. Keeping in mind the availability of equipment's, acceptability to the subjects and legitimate time for collecting data, Resting Pulse Rate, Positive Breathing Holding Time, Negative Breath Holding Time, Body Composition, Systolic Blood Pressure, Diastolic Blood Pressure, Respiratory Rate, Maximum Expiratory Pressure. These measurements and tests were conducted because they are linked to an athlete's performance capabilities.

Statistical Analysis

To find the Impact of Physiological factors in Shot Put performance of Throwers, the Pearson product moment correlation (r), multiple regression and regression analysis was employed.

Analysis of data and findings of the study

Table 1: Descriptive analysis of Physiological variables with Shot Put Performance of Throwers

| Variables | Mean | Std. Deviation |
|---------------------------------|--------|----------------|
| Resting Pulse Rate | 63.35 | 2.80 |
| Positive Breathing Holding Time | 35.75 | 3.96 |
| Negative Breath Holding Time | 20.65 | 3.79 |
| Body Composition | 13.02 | 1.86 |
| Systolic Blood Pressure | 113.40 | 3.66 |
| Diastolic Blood Pressure | 75.05 | 2.48 |
| Respiratory Rate | 167.60 | 6.79 |
| Maximum Expiratory Pressure | 3.98 | 0.67 |

Table- 1 shows the descriptive analysis (Mean \pm S.D.) of Physiological variables with shot put performance of Throwers. Mean and Standard Deviation of Physiological variables are 63.35 and 2.80; 35.75 and 3.96; 20.65 and 3.79; 13.02 and 1.86; 113.40 and 3.66; 75.05 and 2.48; 167.60 and 6.79; 3.98 and 0.67 respectively.

**Table 2:** Relationship of Physiological measurements with shot put performance of Throwers.

| Variables | Pearson Correlation (r) |
|---------------------------------|-------------------------|
| Resting Pulse Rate | -0.775* |
| Positive Breathing Holding Time | -0.269 |
| Negative Breath Holding Time | -0.094 |
| Body Composition | -0.021 |
| Systolic Blood Pressure | -0.042 |
| Diastolic Blood Pressure | -0.132 |
| Respiratory Rate | 0.047 |
| Maximum Expiratory Pressure | 0.361 |

From Table 2 it is clear that that one Physiological variable have significant relationship with shot put performance of Throwers. They are Resting Pulse Rate (-0.775. In respect to other Physiological measurements (Positive Breathing Holding Time, Negative Breath Holding Time, Body Composition, Systolic Blood Pressure, Diastolic Blood Pressure, Respiratory Rate, Maximum Expiratory Pressure) the relationship with shot put performance is not found to be statistically significant at 0.05 level as they are below tabulated value i.e. 0.444.

Conclusion

Based on the findings of the present study, it was found that the Physiological variable .viz Resting Pulse Rate have significant relationship with shot put performance of Throwers.

Therefore, it is suggested that sports training experts and coaches utilize the results of this study for screening and identifying talent in enhancing jump performance within their respective schools, institutions, or colleges.

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