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Physical, Physiological & Anthropometrical Profile of Junior Male Weightlifters of Manipur

Tang Devi[1], Dr. Praloy Kanti Sarkar[2], Dr. Shyam Sundar Rath[3]

[1]Assistant Coach, W.H.P.C (Weightlifting High-Performance Centre), Biju Patnaik Kalinga Stadium, Odisha, India.
[2]Physical Education Teacher, Higher Secondary, Noabari H/S School, Govt. of Tripura, India.
[3]Professor and Dean Academics, Department of Sports Coaching, National Sports University, Imphal, Manipur, India.

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Abstract: The present study aimed to analyze the physical, physiological, and anthropometrical profiles of junior male weightlifters of Manipur. After careful examination of the collected data, a cautious conclusion was drawn with the provision that further research may provide more conclusive results. The individual profiling of 20 junior male weightlifters was assessed through various physical, physiological, and anthropometric parameters. The findings revealed that the average Right Hand (RH) strength and Left Hand (LH) strength scores were 42.685 and 40.90, respectively. The average power score was 52.8, with Right Leg (RL) and Left Leg (LL) balance scores of 2.3 and 3.05, and flexibility score of 19.675. The physiological profile showed average systolic blood pressure (SBP) of 122.8, diastolic blood pressure of 74.6, body temperature score of 87.085, oxygen saturation of 96.45, and heart rate of 74.55. The anthropometrical profile indicated average height of 158.04 cm, body weight of 72.225 kg, BMI of 24.730, BSA of 1.7350, Ponderal Index of 15.415, and body fat percentage of 10.886. The study provides valuable information regarding the physical, physiological, and anthropometric characteristics of junior male weightlifters of Manipur, which may assist coaches, trainers, and selectors in athlete assessment, training planning, and performance enhancement.

Keywords: Physical, Physiological & Anthropometrical Profile, weightlifters.

INTRODUCTION

It is usual and useful to assess physical fitness components before preventative and rehabilitative treatments since physical fitness measures are directly linked to disease prevention and health promotion. Exercise and regular physical activity can alter physical fitness. A strong positive correlation has been seen between physical fitness components and improved results in physical activity, including involvement in sports.

Fitness is a broad term that includes a variety of skills and is defined as the capacity to engage in physical activity. Being fit for a particular sport necessitates having a specific skill set because every sport and activity has its own set of requirements. It's not a given that being fit for one sport will translate to another. Increasing general fitness is beneficial for any activity or type of exercise. The most significant gains in performance come from training that particularly focuses on choosing the right activities.

Health, as defined by WHO (1948), is complete physical, mental, and social well-being, not merely the absence of disease. Fitness is the ability to meet physical demands and includes components such as strength, power, agility, balance, flexibility, endurance, coordination, and speed. Physical fitness focuses on body composition, endurance, flexibility, strength, and speed, while motor fitness emphasizes agility, balance, coordination, power, and reaction time. Training should target the key fitness components and energy systems specific to the sport or event.

Human physiology studies how the body's cells, organs, and systems—including the nervous, endocrine, circulatory, respiratory, digestive, and urinary systems—work together to maintain internal balance. It also includes cellular and exercise physiology, which examine the body's responses and adaptations to physical activity. Sports physiology focuses on how exercise affects body structure and function, using scientific tests to evaluate athletic performance. This knowledge helps coaches, trainers, fitness professionals, and exercise physiologists optimize fitness, improve performance, and support athlete health.

This study of anatomy and physiology gave rise to exercise physiology, which looks at the changes that acute and long-term activity can make to the body's structures and functioning. It essentially refers to how the body adjusts physiologically to the acute stress that comes with exercise and the persistent stress that comes

***Corresponding Author:** Dr. Praloy Kanti Sarkar

with physical training. These ideas from exercise physiology are further applied in sports physiology with a focus on athlete training and performance enhancement in a particular sport. Exercise and sport physiology is the study of how the body works during physical activity. By applying scientific concepts, it enables you to train more effectively, perform better, recuperate more quickly, and support athletes in reaching their goals.

Homeostasis regulates the body's internal environment during exercise by maintaining factors such as blood glucose, pH, oxygen levels, and body temperature. Training adaptations are influenced by specificity, reversibility, and individuality, with each person responding differently to exercise. Physical activity enhances cardiovascular, respiratory, and muscular functions by increasing oxygen delivery, energy production, blood flow, and endurance, while improving heart efficiency, aerobic capacity, overall performance, and reducing the risk of injury.

Strength training improves muscle strength, power, and endurance, while endurance training enhances muscle oxidative capacity. Different physical activities rely on the phosphagen (ATP-PC), anaerobic glycolytic, and aerobic energy systems. Understanding these energy systems helps athletes optimize their training for better performance. Exercise also promotes neuromuscular adaptations, including improved motor control, coordination, and muscle recruitment patterns.

Exercise influences endocrine function by regulating hormones such as growth hormone, cortisol, and adrenaline, which control metabolism, energy production, tissue repair, and recovery. It also improves neuromuscular coordination, enhancing reflexes, agility, movement patterns, and proprioception, thereby improving performance and reducing injury risk. Maintaining optimal body temperature through effective thermoregulation, proper hydration, and cooling strategies is essential for sustaining performance and preventing overheating and dehydration, especially during hot conditions or endurance events.

Profiling in sports science refers to the systematic collection and analysis of data to assess the physical, physiological, anthropometrical, psychological, and skill-related attributes of athletes. The primary goal of profiling is to gain a comprehensive understanding of an athlete's strengths and weaknesses, enabling coaches, sports scientists, and athletes themselves to make informed decisions regarding training, performance enhancement, injury prevention, and talent identification.

Athlete profiling evaluates physical characteristics (height, weight, body composition, muscle mass, and skeletal structure), physiological functions (cardiovascular fitness, respiratory capacity, energy systems, and metabolism), biomechanics (movement patterns and technique), psychological traits (motivation, confidence, mental toughness, and stress management), and sport-specific skills. It also assesses injury risk, monitors performance through regular evaluations, identifies talent, and supports the development of individualized training programs. Continuous profiling, enhanced by modern technology, enables coaches to analyze performance accurately, optimise training, improve athletic performance, reduce injury risk, and identify future sporting talent.

OBJECTIVE OF THE STUDY

- To assess the anthropometric component of junior weightlifters of Manipur.
- To identify the selected physical variables of the junior weightlifters of Manipur.
- To identify the selected physiological variable of the junior weightlifters of Manipur.

SIGNIFICANCE OF THE STUDY

- The findings support the development of scientific training schedules and individualized training programmes to improve weightlifting performance.
- The study provides an understanding of the current physical, physiological, and anthropometric status of junior weightlifters in Manipur.
- The results offer valuable insights for coaches and athletes to identify performance-related factors and implement appropriate training strategies.
- The study serves as a useful reference for further investigations in the fields of physical education, sports coaching, and weightlifting.

METHODOLOGY

For this study, the researcher obtained permission from the Regular Coaching Centre (RCC) and National Sports Academy (NSA) in different parts of Manipur to conduct the investigation. With the support of the coaches and supervisor, the purpose of the study was explained to the athletes, and informed consent was obtained. A total of 20 junior male weightlifters (10 from RCC and 10 from NSA), who were preparing for state-level, national championships, School Games, and Khelo India Games, were finally selected as the subjects for the study.

SELECTION OF VARIABLES

In this study, the variables were carefully selected based on the research objectives, literature review, expert consultation, and the researcher's understanding. The selected variables included physical variables (strength, power, flexibility, and balance), physiological variables (heart rate, blood pressure, body temperature, and oxygen saturation), and anthropometrical variables (height, weight, and skinfold measurements at the biceps, triceps, and subscapular sites) to assess the profiles of junior weightlifters.

***Corresponding Author:** Dr. Praloy Kanti Sarkar

SELECTION OF TEST, EQUIPMENT AND MEASURES

The study assessed 11 variables using standardized tests and equipment: strength (hand dynamometer), power (horizontal fitness test), balance (semi-balancing ball), flexibility (sit-and-reach test), heart rate and oxygen saturation (pulse oximeter), blood pressure (sphygmomanometer), body temperature (thermometer), height (stadiometer), weight (weighing machine), and skinfold thickness (Harpenden caliper). The subjects were selected from the Regional Coaching Centre (RCC) and National Sports Academy (NSA) of Manipur. Data were collected in a familiar training environment, and participants were encouraged to perform the tests honestly and sincerely.

ANALYSIS AND INTERPRETATION OF DATA

This chapter contains statistically treated data consequences, findings and discussions to discover the information on strength, power, balance, flexibility, heart rate, body temperature, blood pressure, oxygen saturation, and skinfold measurement (biceps, triceps and subscapular) of the Regional Coaching Center (RCC) of Manipur and National Sports Academy (NSA). The objectives of the study were:

Table 1: Mean score of physical variables for junior male weightlifter

Physical Variables	Mean Score
Right Hand Strength	42.685
Left Hand Strength	40.910
Power	52.800
Right Leg Balance	2.300
Left Leg Balance	3.050
Flexibility	19.675

Table No. 1 shows the mean score of selected physical variables of junior male weightlifters.

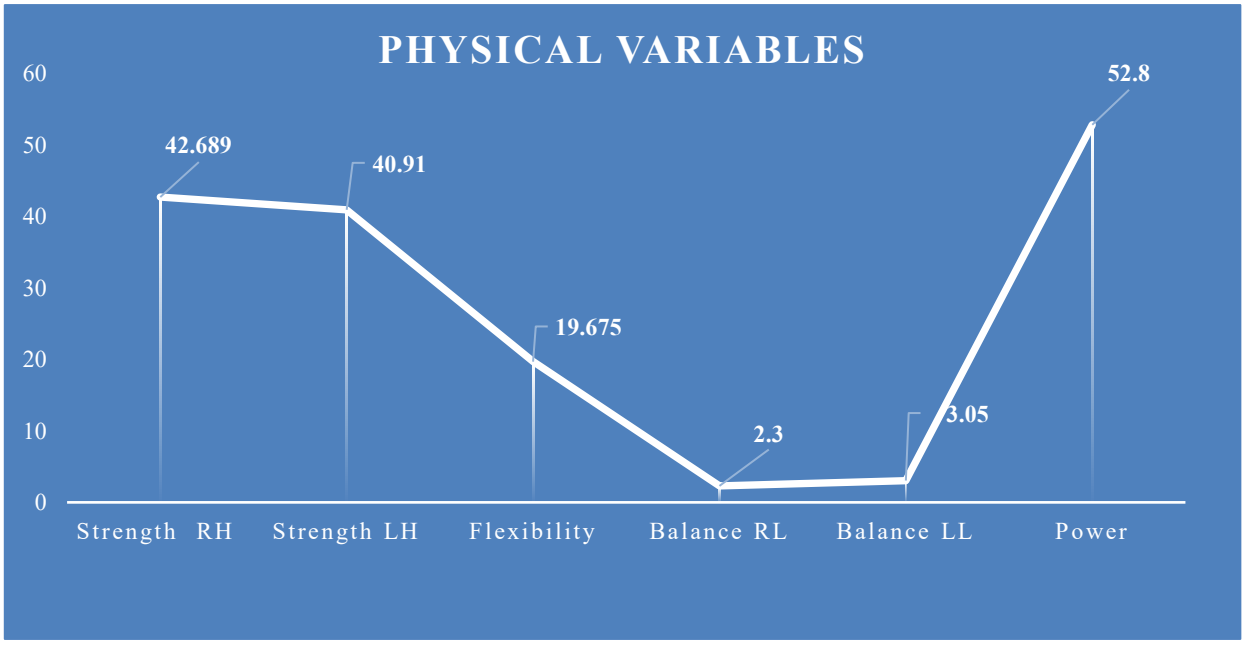

Figure 1: Graphical representation of the mean score of selected physical variables for junior male weightlifter.

Figure no. 1 shows the graphical representation of the mean score of selected physical variables for junior male weightlifter. The mean score for strength of right hand for junior male weightlifting groups is 42.689. Whereas, the average LH strength score of junior weightlifting is 40.91. Further, the average score of power is 52.8, the mean score for Balance of Right Leg and Left Leg are 2.3 and 3.05, respectively, and the mean score of flexibility is 19.675 junior male weightlifters.

Table 2: Mean score of physiological variables for junior male weightlifter

Physiological Variables	Mean Score
Systolic Blood Pressure (mmHg)	122.80
Diastolic Blood Pressure (mmHg)	74.60
Oxygen Saturation (%)	96.45
Body Temperature (°F)	87.09*
Heart Rate (beats/min)	74.55

Table No. 2 shows the mean score of selected physiological variables of junior male weightlifters.

***Corresponding Author:** Dr. Praloy Kanti Sarkar

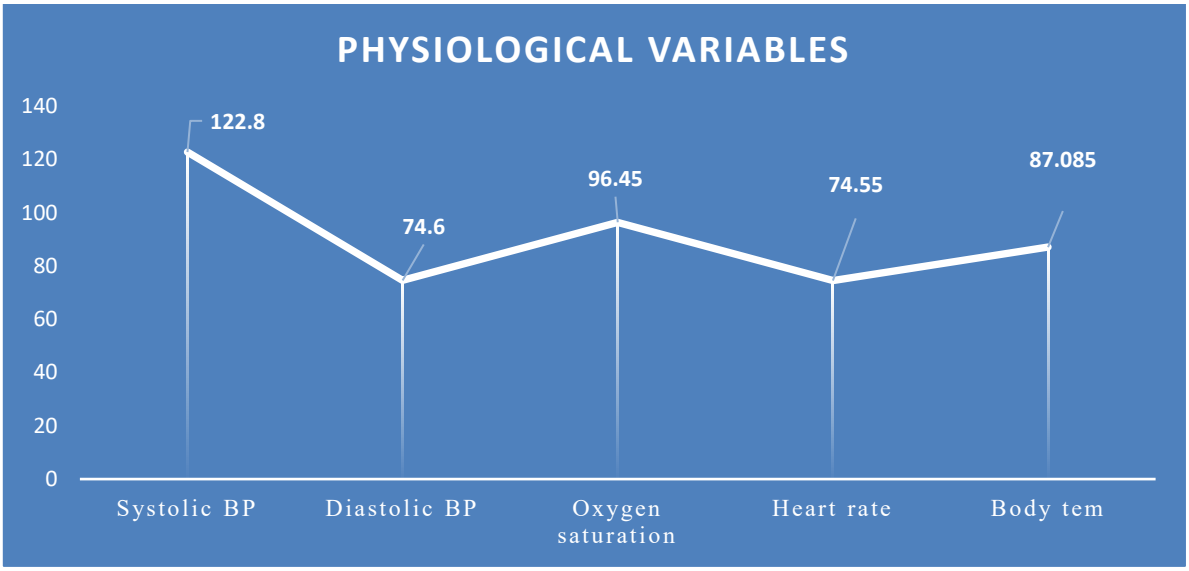

Figure 2: Graphical representation of the mean score of selected physiological variables for junior male weightlifter.

The mean score for Systolic blood pressure for junior male weightlifting groups is 122.8. Additionally, the average diastolic blood pressure score of junior weightlifting is 76.6 The average score of Oxygen saturation is 96.45, the mean score for Body temperature is 87.085, respectively, and the mean score of Heart rate is 74.55 junior male weightlifters.

Table 3: Mean score of anthropometrical variables for junior male weightlifter

Anthropometrical Variables	Mean Score
Height (cm)	158.040
Weight (kg)	72.225
Body Mass Index (BMI) (kg/m²)	24.730
Body Surface Area (BSA) (m²)	1.7350
Ponderal Index (PI)	15.415
Body Fat Percentage (FP) (%)	10.886

Table 3 shows the mean score of selected anthropometrical variables of junior male weightlifters.

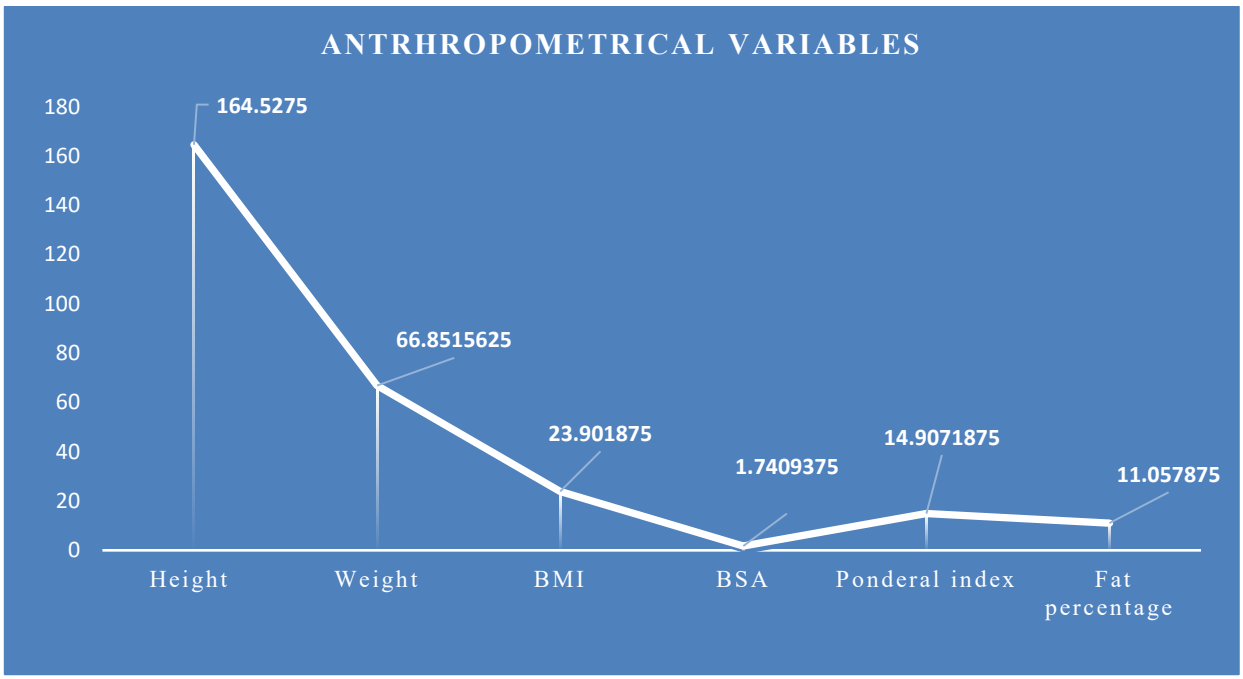

Figure 3: Graphical representation of the mean score of selected anthropometrical variables for junior male weightlifters.

***Corresponding Author:** Dr. Praloy Kanti Sarkar

The mean score for height for junior male weightlifting groups is 163.14. Additionally, the average weight score of junior weightlifting is 67.125. The average score of Biceps is 5.2; the mean score for Triceps is 10.08, respectively, and the mean score of subscapular is 12.4 for junior male weightlifters.

PART 2: Profiling of junior male weightlifters of Manipur.

The illustration of physical, physiological and anthropometrical profiling of player/ lifter of junior male weightlifter of Manipur is given below in figures.

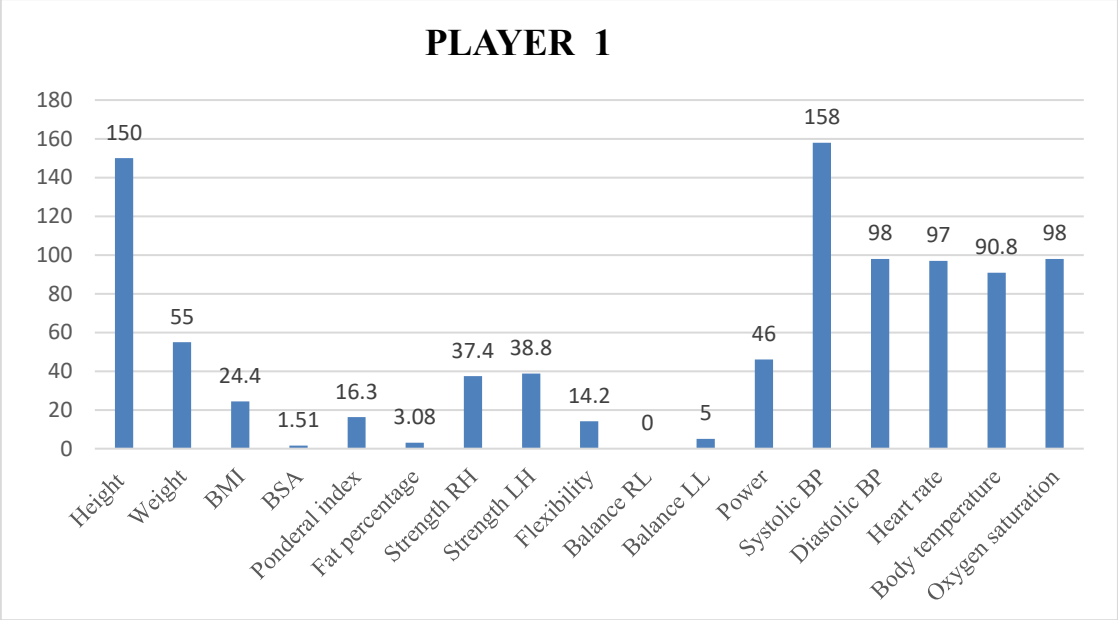

Figure 4: Physical, physiological and anthropometrical profiling of player 1
The graph above demonstrates that player 1's accurate outcomes value

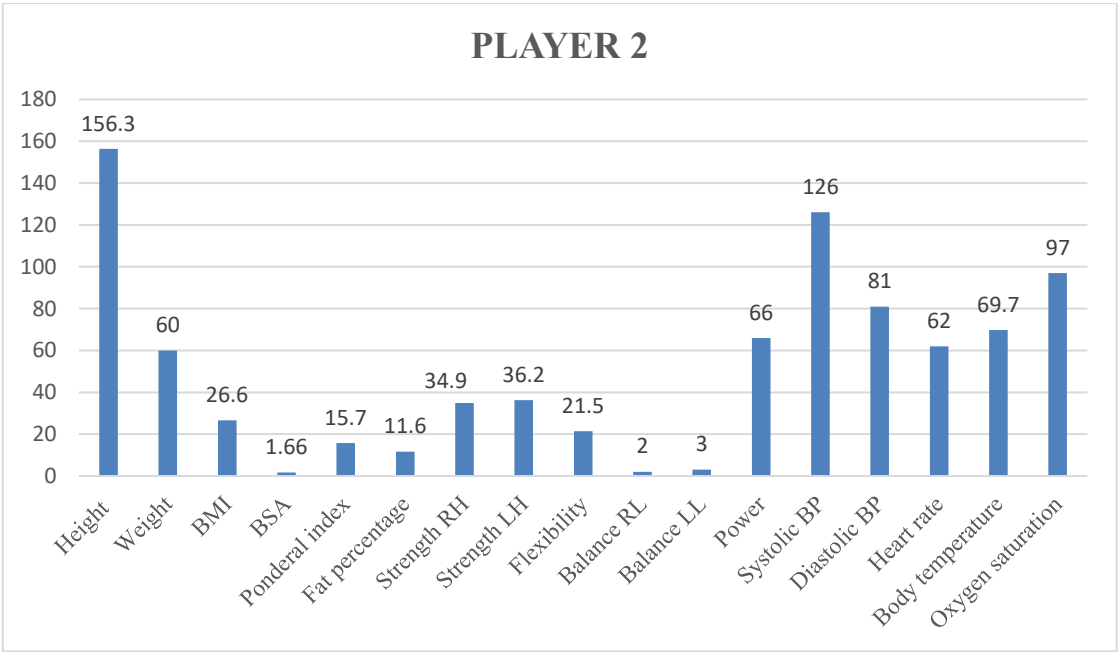

Figure 5: Physical, physiological and anthropometrical profiling of player 2
The graph above demonstrates that player 2's accurate outcomes value

***Corresponding Author:** Dr. Praloy Kanti Sarkar

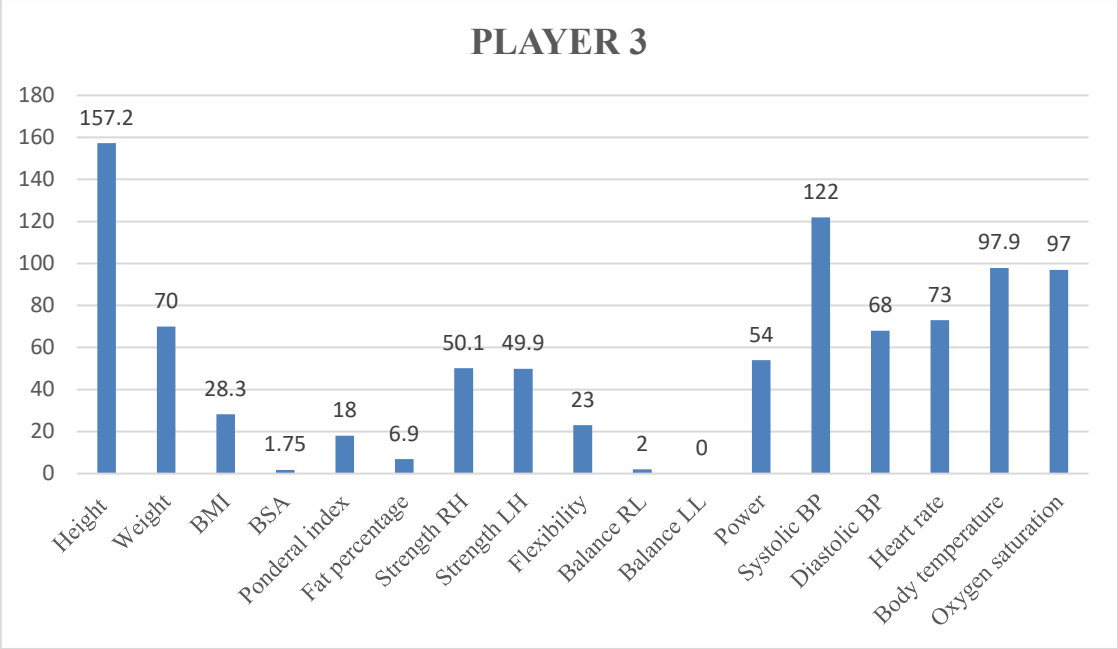

Figure 6: Physical, physiological and anthropometrical profiling of player 3
The graph above demonstrates that player 3's accurate outcomes value

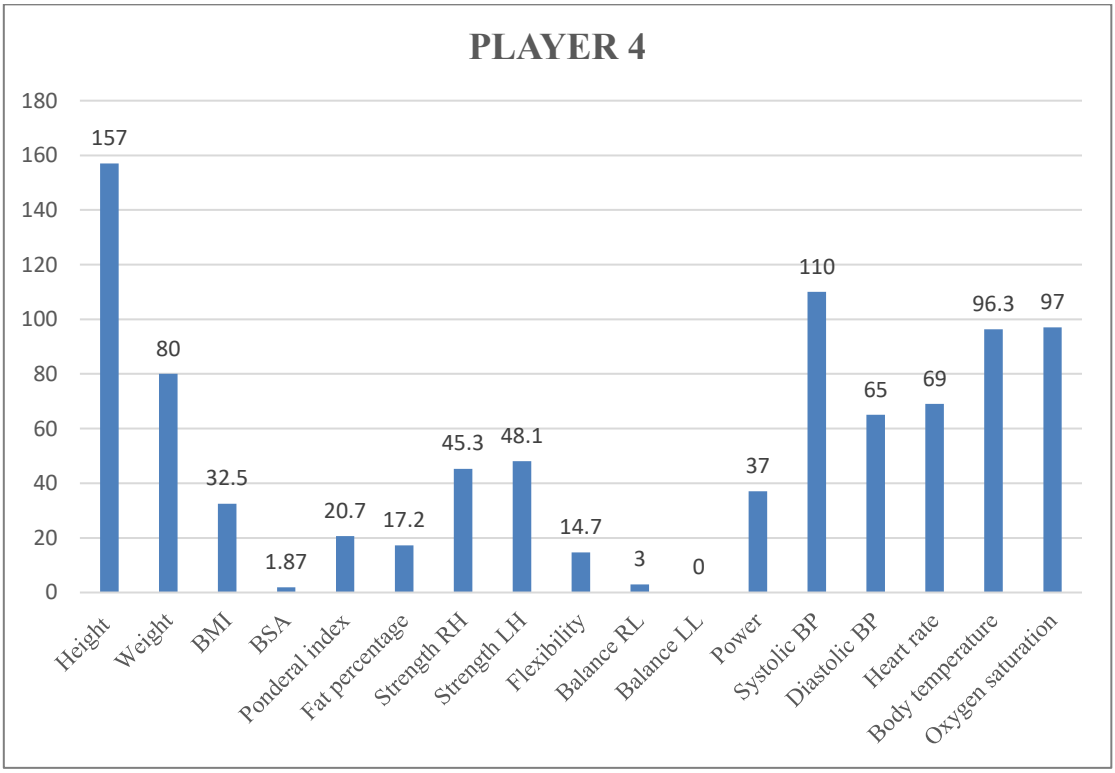

Figure 7: Physical, physiological and anthropometrical profiling of player 4
The graph above demonstrates that player 4's accurate outcomes value

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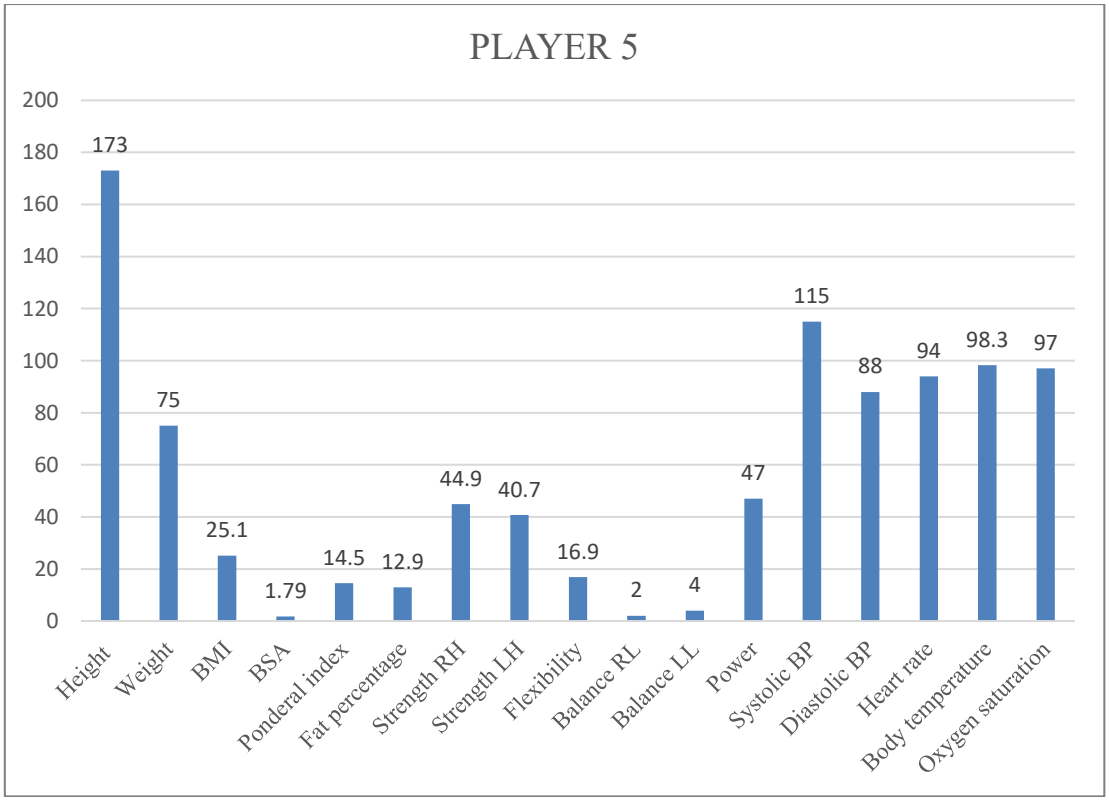

Figure 8: Physical, physiological and anthropometrical profiling of player 5
The graph above demonstrates that player 5's accurate outcomes value

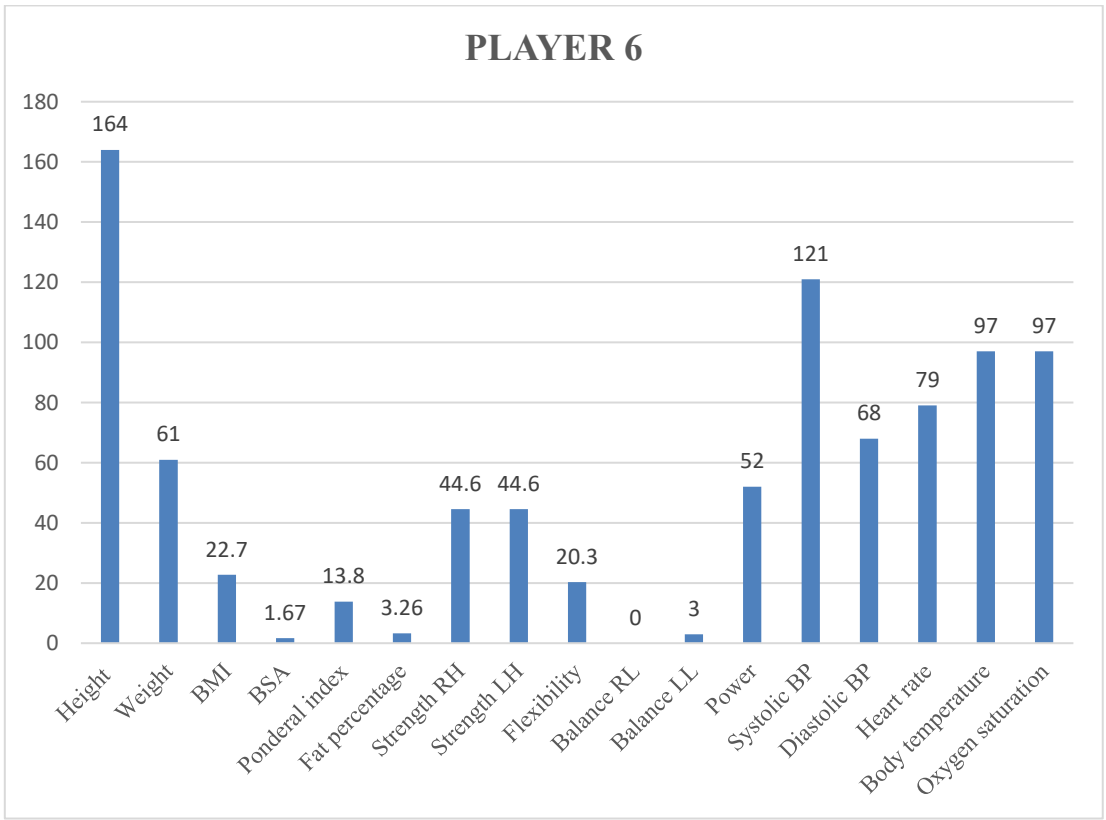

Figure 9: Physical, physiological and anthropometrical profiling of player 6
The graph above demonstrates that player 6's accurate outcomes value

***Corresponding Author:** Dr. Praloy Kanti Sarkar

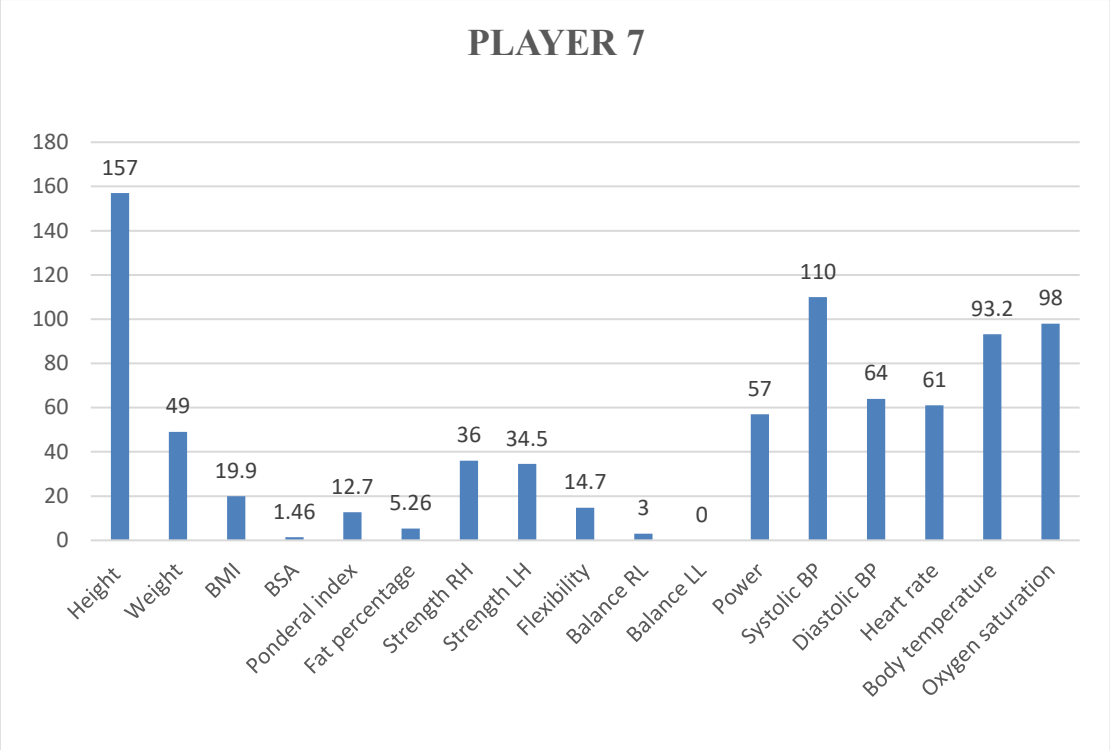

Figure 10: Physical, physiological and anthropometrical profiling of player 7
The graph above demonstrates that player 7's accurate outcomes value

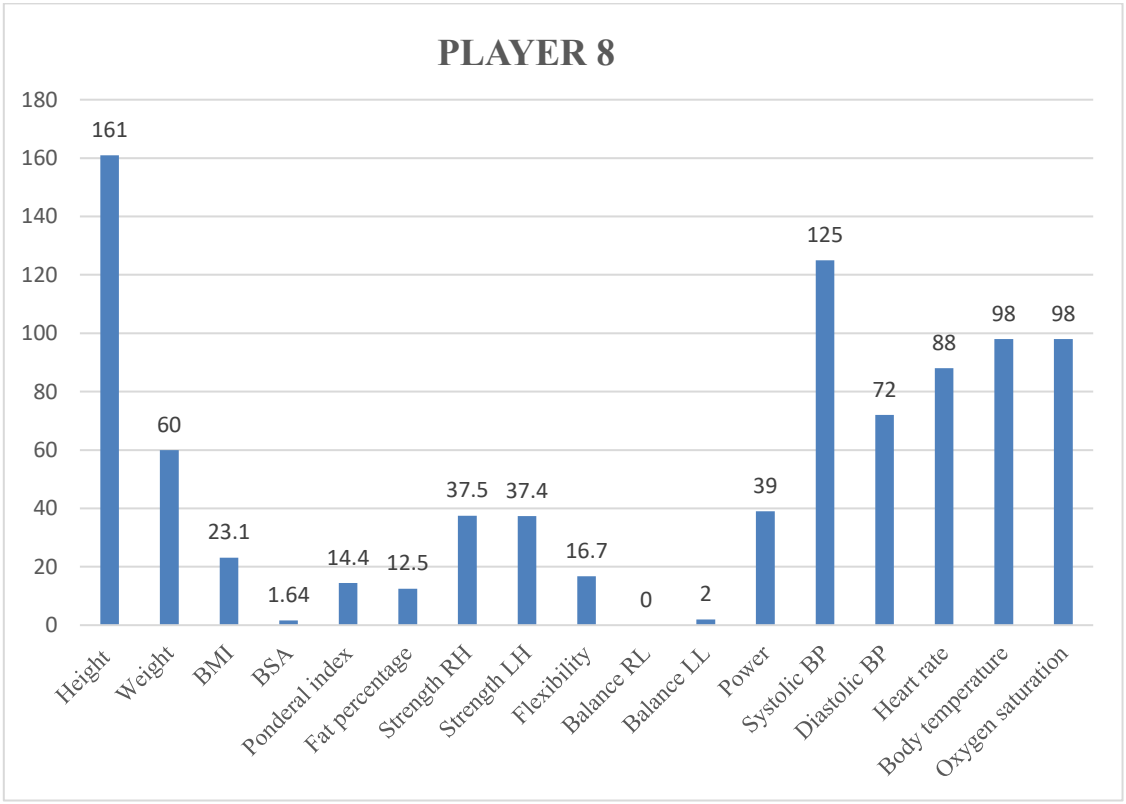

Figure 11: Physical, physiological and anthropometrical profiling of player 8
The graph above demonstrates that player 8's accurate outcomes value

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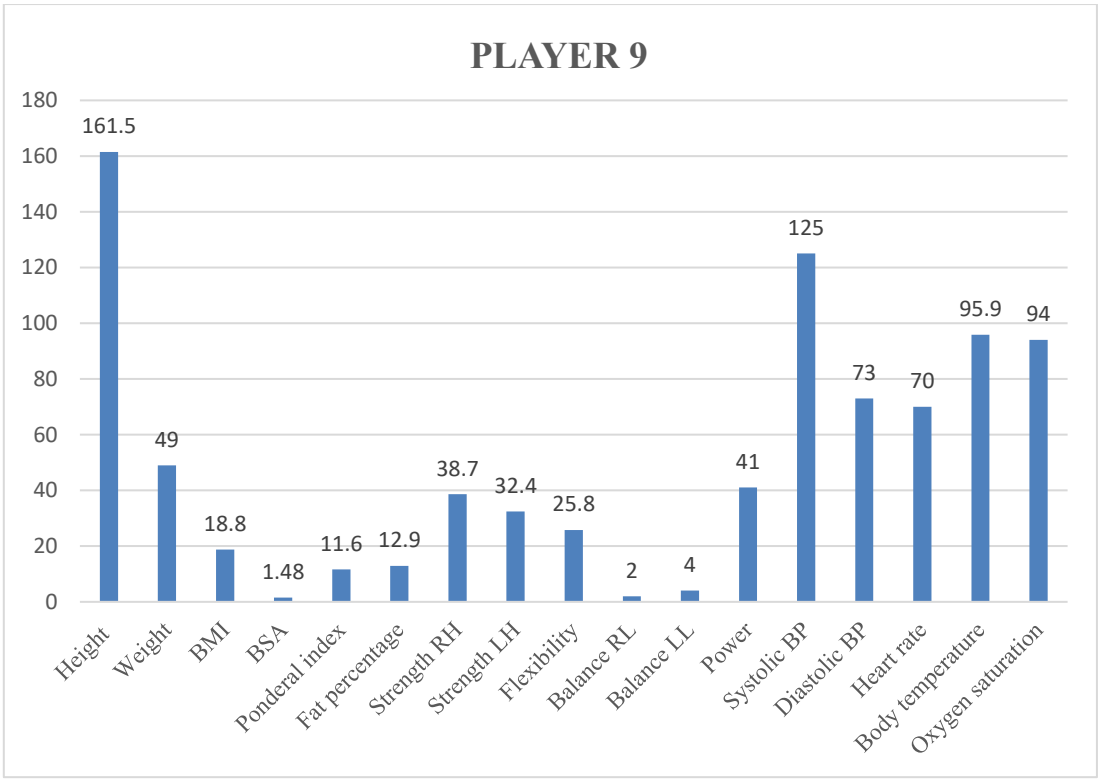

Figure 12: Physical, physiological and anthropometrical profiling of player 9
The graph above demonstrates that player 9's accurate outcomes value

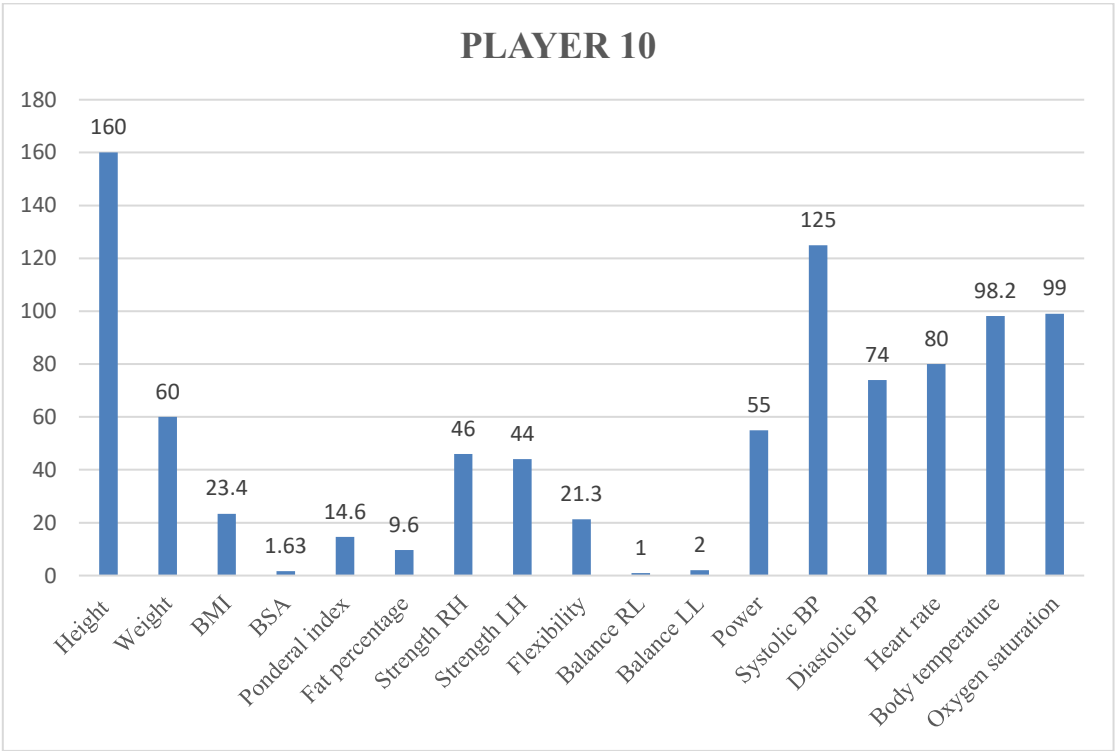

Figure 13: Physical, physiological and anthropometrical profiling of player 10
The graph above demonstrates that player 10's accurate outcomes value

***Corresponding Author:** Dr. Praloy Kanti Sarkar

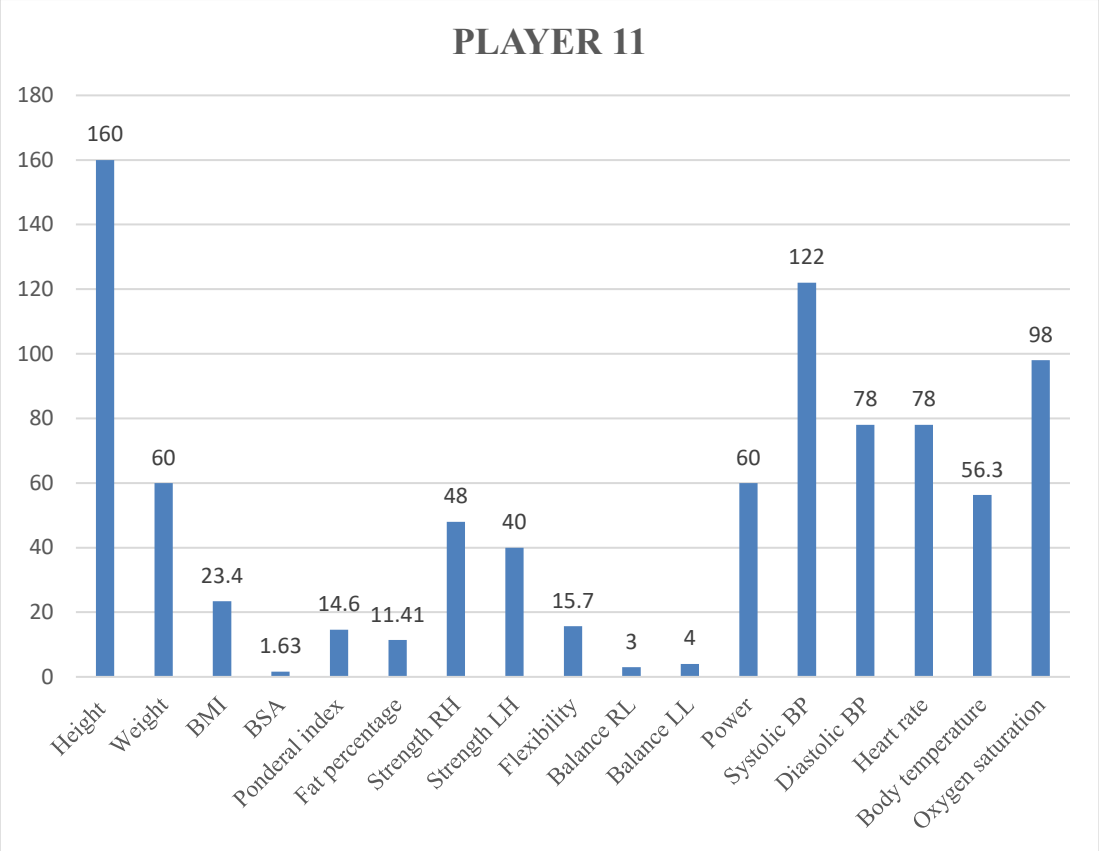

Figure 14: Physical, physiological and anthropometrical profiling of player 11
The graph above demonstrates that player 11's accurate outcomes value

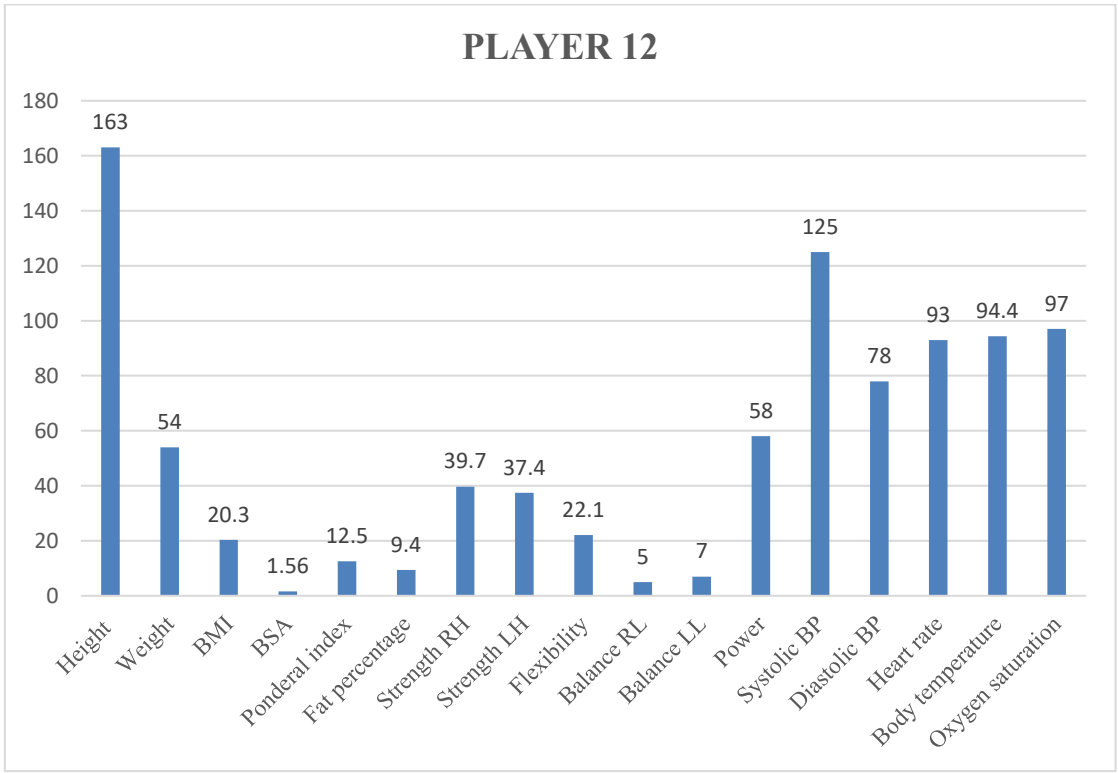

Figure 15: Physical, physiological and anthropometrical profiling of player 12
The graph above demonstrates that player 12's accurate outcomes value

***Corresponding Author:** Dr. Praloy Kanti Sarkar

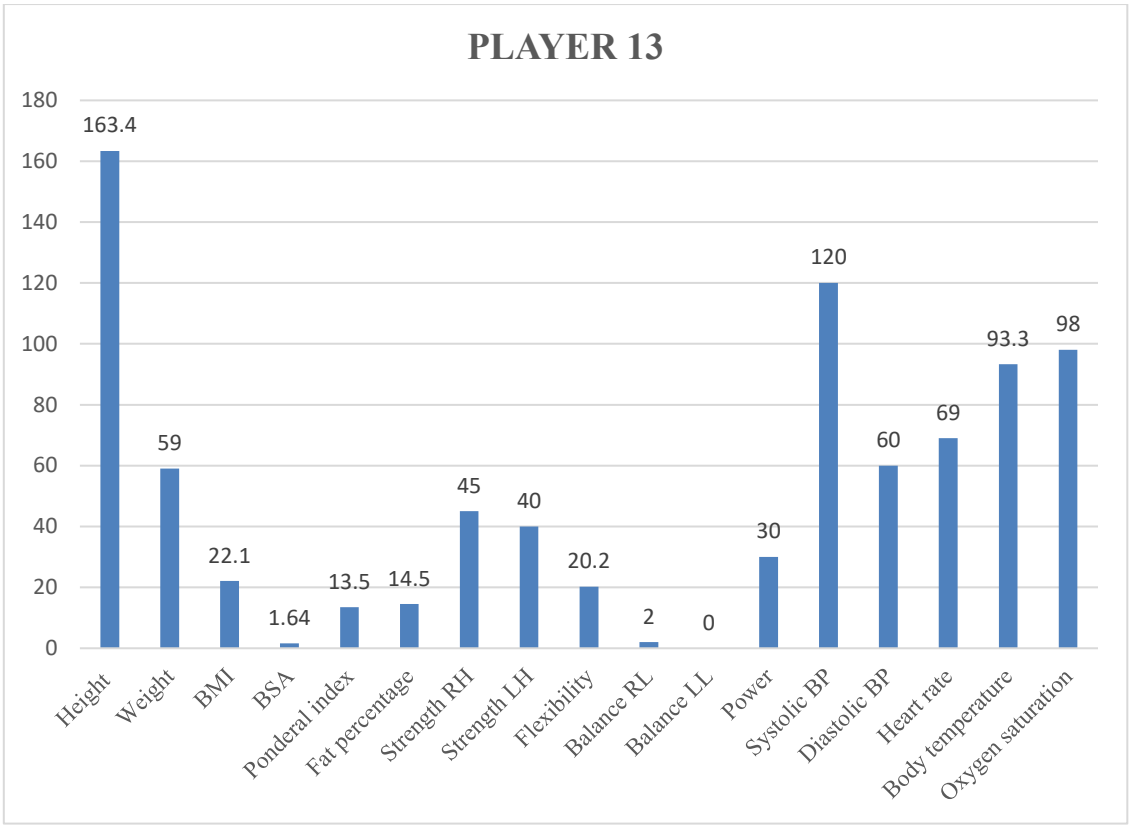

Figure 16: Physical, physiological and anthropometrical profiling of player 13
The graph above demonstrates that player 13's accurate outcomes value

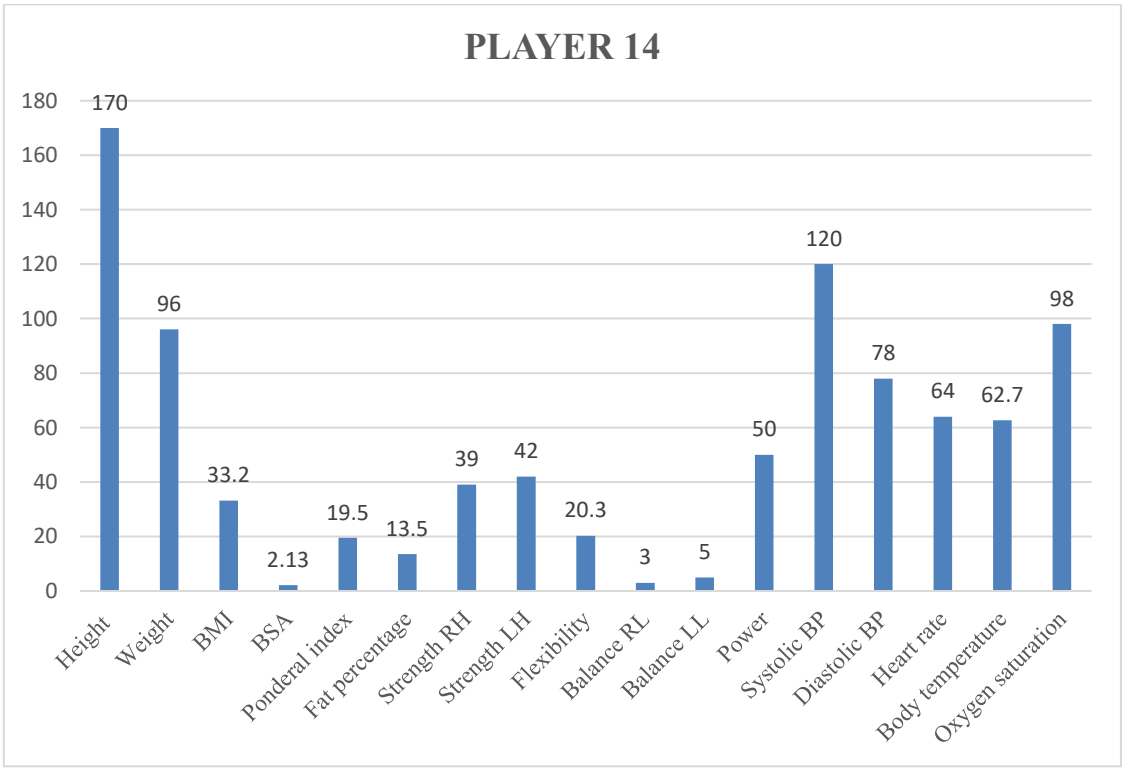

Figure 17: Physical, physiological and anthropometrical profiling of player 14
The graph above demonstrates that player 14's accurate outcomes value

***Corresponding Author:** Dr. Praloy Kanti Sarkar

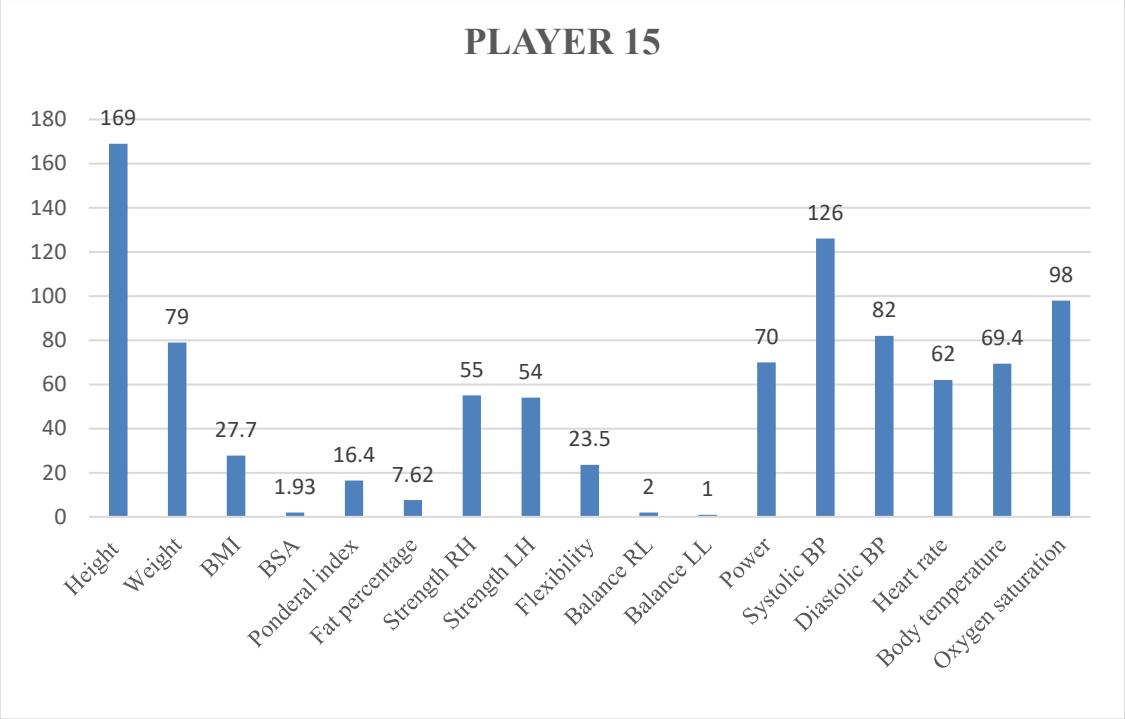

Figure 18: Physical, physiological and anthropometrical profiling of player 15
The graph above demonstrates that player 15's accurate outcomes value

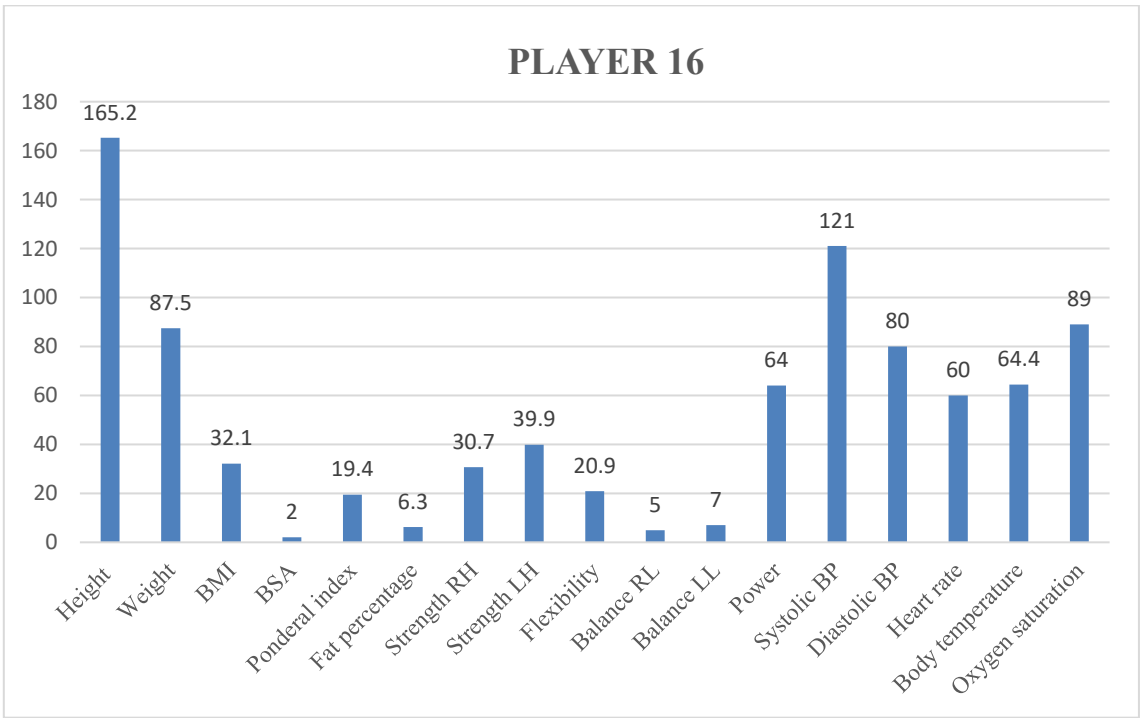

Figure 19: Physical, physiological and anthropometrical profiling of player 16
The graph above demonstrates that player 16's accurate outcomes value

***Corresponding Author:** Dr. Praloy Kanti Sarkar

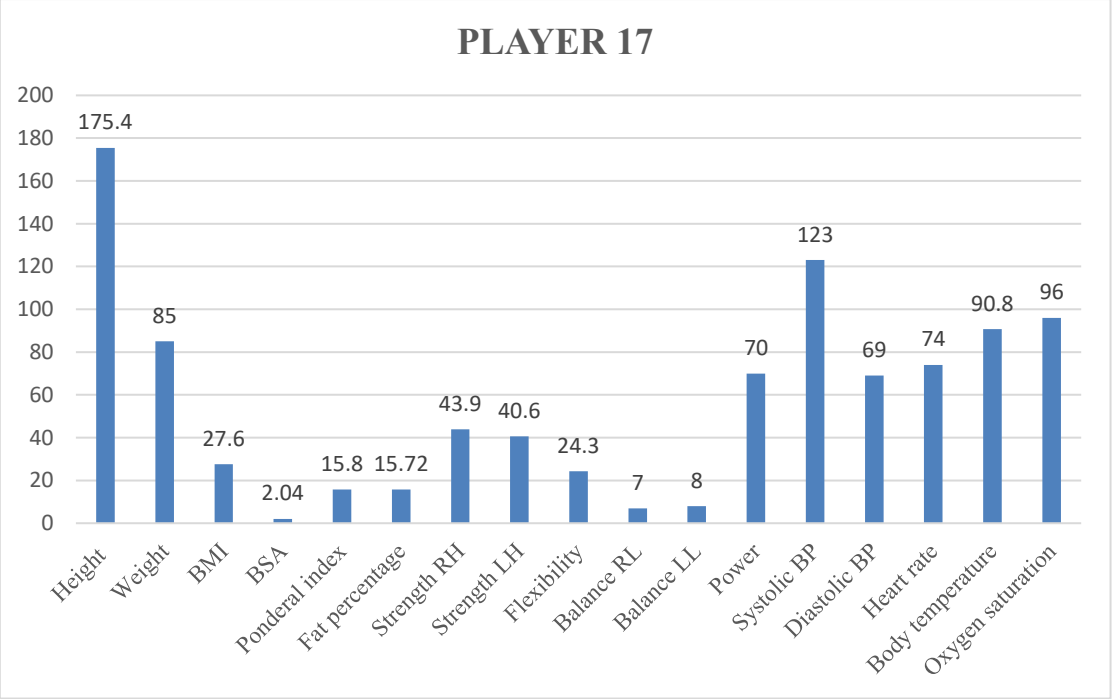

Figure 20: Physical, physiological and anthropometrical profiling of player 17
The graph above demonstrates that player 17's accurate outcomes value

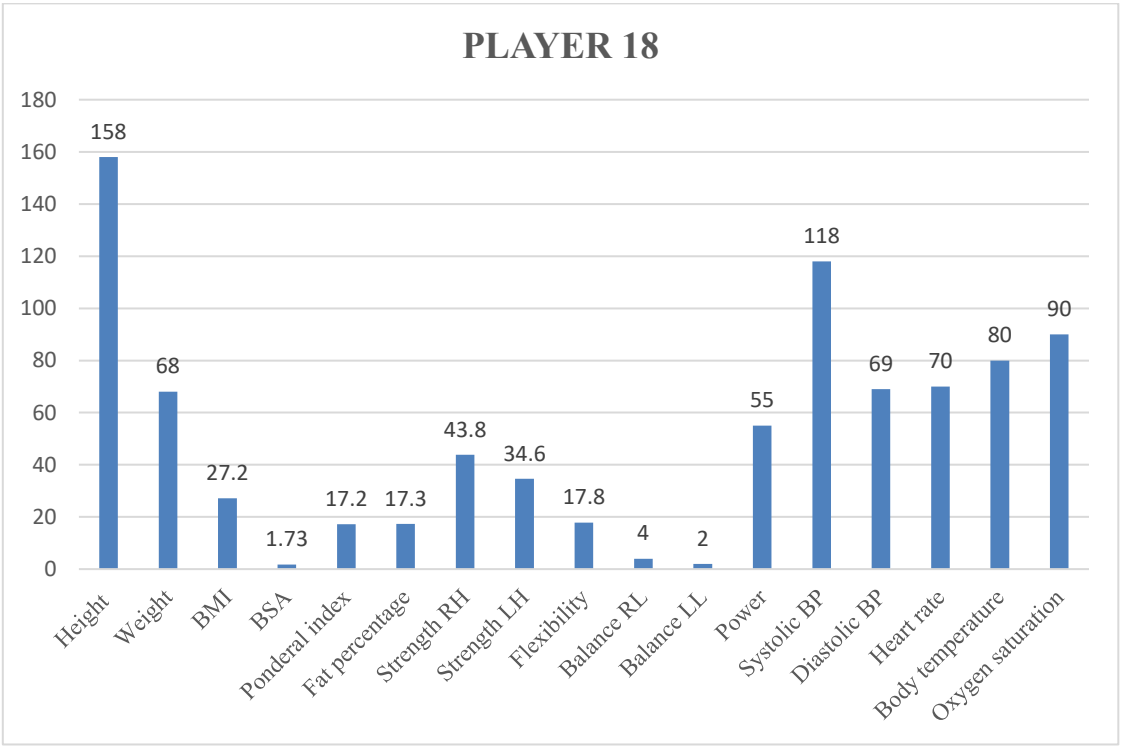

Figure 21: Physical, physiological and anthropometrical profiling of player 18
The graph above demonstrates that player 18's accurate outcomes value

***Corresponding Author:** Dr. Praloy Kanti Sarkar

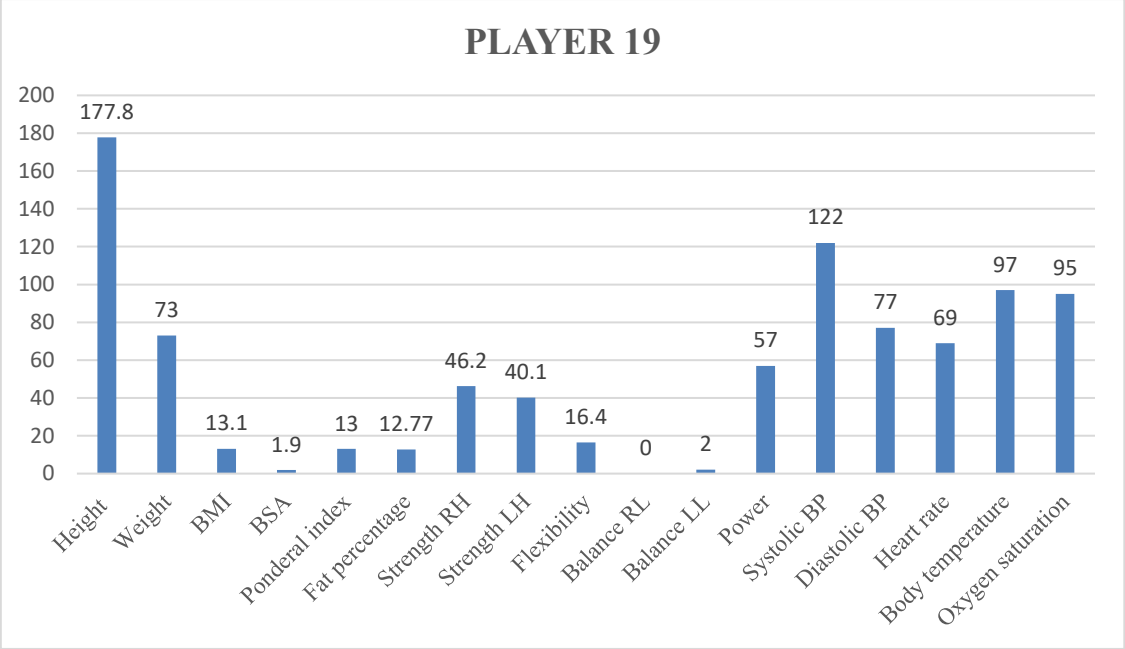

Figure 22: Physical, physiological and anthropometrical profiling of player 19
The graph above demonstrates that player 19's accurate outcomes value

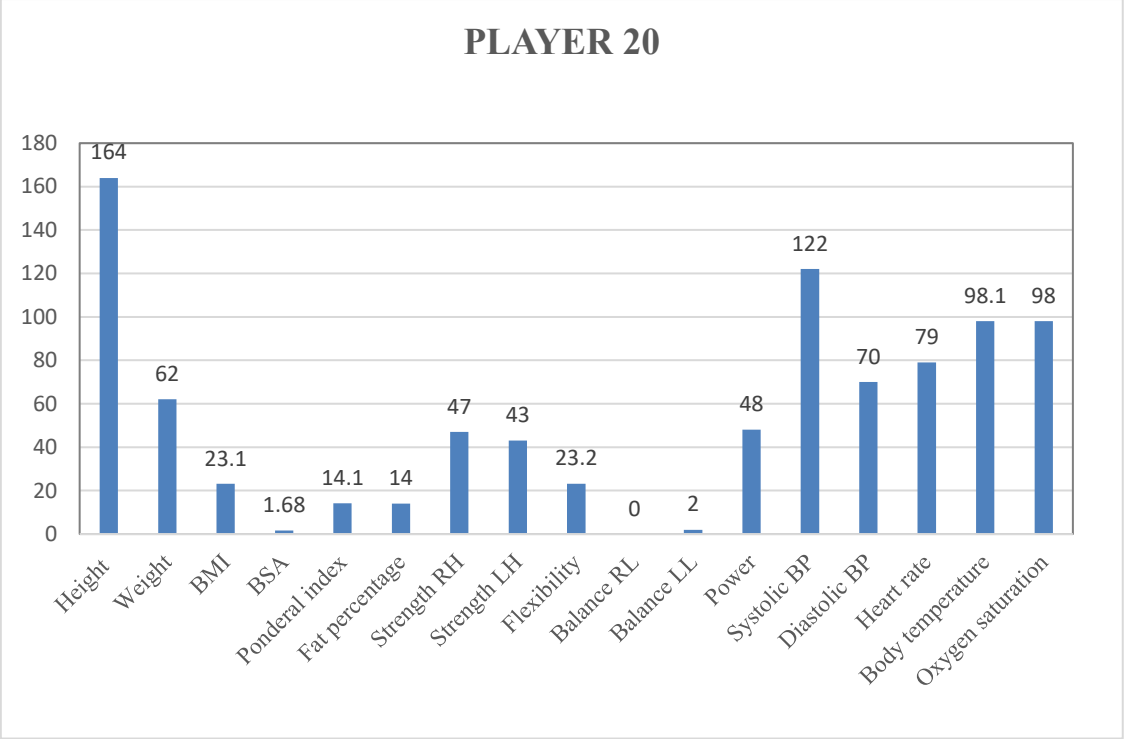

Figure 23: Physical, physiological and anthropometrical profiling of player 20
The graph above demonstrates that player 20's accurate outcomes value

DISCUSSION OF FINDINGS

The purpose of the study was to profile the selected physical, physiological, and anthropometrical variables of junior male weightlifters of the Regular Coaching Centre (RCC) and National Sports Academy (NSA) in different parts of Manipur

1. Height and weight: The study's anthropometric variable of height's average is 163.40m and weight 67.12kg.
2. BMI: The study's anthropometric variable of BMI's average is 24.73g/m2
3. BSA: The study's anthropometric variable of BSA's average is 1.73 m2

***Corresponding Author:** Dr. Praloy Kanti Sarkar

4. PI: The study's anthropometric variable of PI's average is 15.415kg/m3
5. Right-hand and Left-hand strength: The study's PHYSICAL variable of strength RH and LH average is 42-40.
6. Flexibility: The study's physical variable of Flexibility of average of 19.67
7. Power: The study's physical variable of Power of average is 52.8
8. Blood pressure: The study's physiological variable of blood pressure's average of 110/60 mm Hg.
9. Balance both legs: The study's physical variable of both legs average is RL 2.30 and LL.
10. Oxygen saturation: The study's physiological variable of oxygen saturation is 96.45%(±2.6%).
11. Heart rate: The study's physiological variable, the average heart rate, is 122/74.

CONCLUSIONS

After carefully examining the data of the present study, a cautious conclusion is drawn with the provision that further research may provide more conclusive results. The following findings were obtained:

- The overall results of individual profiling illustrate the physical, physiological, and anthropometric profiles of junior male weightlifters of Manipur. The overall performance scores of players from 1 to 20 are presented through charts.
- Physical Profile: The average Right Hand (RH) strength score among the junior male weightlifting groups was 42.685, while the average Left Hand (LH) strength score was 40.90. The average power score was 52.8, the average Right Leg (RL) and Left Leg (LL) balance scores were 2.3 and 3.05, respectively, and the average flexibility score was 19.675 among junior male weightlifters.
- Physiological Profile: Table 2 shows that the average systolic blood pressure (SBP) score among junior male weightlifting groups was 122.8, and the average diastolic blood pressure score was 74.6. The average body temperature score was 87.085, oxygen saturation score was 96.45, and heart rate was 74.55 among junior male weightlifters.
- Anthropometrical Profile: Table 3 shows that the average height score among junior male weightlifting groups was 158.04, and the average body weight was 72.225. The average scores for Body Mass Index (BMI), Body Surface Area (BSA), Ponderal Index (PI), and body fat percentage were 24.730, 1.7350, 15.415, and 10.886, respectively, among junior male weightlifters of Manipur.

RECOMMENDATIONS

The present study was unique as it was the first attempt to develop a physical, physiological, and anthropometrical profile of Indian weightlifting athletes. The findings of the study will help coaches, trainers, and selectors to understand the physical, physiological, and anthropometric characteristics of junior male weightlifters for better training and selection processes.

RECOMMENDATIONS:

1. Similar studies can be conducted on female weightlifters at youth, sub-junior, junior, senior, and elite levels.
2. Future research may use a larger sample size for more comprehensive findings.
3. Profiling studies can be extended to other sports such as powerlifting, boxing, and other athletic events.
4. Similar research can be conducted on both male and female athletes.
5. Studies may include different anthropometric, physiological, and physical variables for better understanding of performance characteristics.
6. Similar studies can be carried out among athletes of different age groups and competitive levels, including youth, sub-junior, senior, and elite categories.
7. Coaches should assess the physiological, anatomical, and physical characteristics of their athletes to identify the factors that contribute most effectively to team performance.

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***Corresponding Author:** Dr. Praloy Kanti Sarkar