

# Role of exercise physiologists in talent identification, training and monitoring performance in sports

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## ABSTRACT

Exercise Physiology is the branch of 'Sports Science', which involves the study of adaptation to exercise. Exercise physiologists monitor the physical and physiological variables of the sports persons, which are used for talent identification, training, and evaluation of performance. Sports talent may be identified from young children when they show interest in sports. Proper nutrition and training during the growth and development phase of life help improve the athletes' performance. Training has to be formulated according to the principles of periodization to achieve the best possible performance. Long-term training and participating in competitions brought changes within the sports persons. Regular monitoring of athletes' anthropometric, physical fitness and physiological variables provides valuable information about their fitness, health, metabolic and cardio-respiratory status. This would enable the coaches to assess the current status of the athletes and the degree of training adaptability and provide an opportunity to modify the training schedule accordingly to achieve the desired performance. Exercise physiologists suggest optimal training strategies to enhance athletic performance. The demand for an athlete's success and fitness awareness within society increases the responsibility of exercise physiologists to optimize athletes' sports performance, health, and safety.

**Keywords:** Body composition,  $VO_{2max}$ , strength, anaerobic power, training

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## INTRODUCTION

Exercise Physiology is a specialized branch of 'Physiology', which deals with the study of acute responses and chronic adaptations to a given exercise.<sup>1</sup> The research findings showed the understanding of the effects of exercise on different body systems viz. neuro-muscular, cardiovascular, respiratory and endocrine systems, that may change the endurance capacity, power, strength, and flexibility etc.<sup>2</sup> The effects of sports training on the body systems have been considered as the adaptive changes in the body due to the impact of exercise.<sup>3</sup> It has been observed that exercise may elevate metabolic activities.<sup>4</sup> Recent studies focus on the body's cells and molecular changes arising from exercise.<sup>5,6</sup> Successful performance in international-level sports depends on physical and physiological factors apart from technique and skills.<sup>7</sup> An important factor determining the athlete's potential may be a heredity trait linked with anthropometric characteristics, cardiovascular fitness, and muscle fibre types.<sup>7</sup> Sports performance is also influenced by the health and nutritional status of the athlete during the competition.<sup>8</sup>

The exercise physiologists monitor the morphological (anthropometric), physical fitness and physiological variables of the athletes at different intervals, which provide valuable information to the coaches to identify the fitness status of the athletes. This helps to select the best players in different positions during the competition. The monitoring of morphological, physical fitness and physiological variables are also used for talent identification, improvement in training, and evaluation of performance.<sup>9</sup> The exercise physiologists thus help the coaches identify each athlete's strengths and weaknesses and suggest ways to improve these areas. Exercise physiologists also focus on the optimal

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training strategies in order to enhance athletic performance.<sup>9</sup> The research findings in exercise physiology are focused on to enhance athletic performance. The demand for athletic success, and awareness on fitness, health and safety of the athletes increases the responsibility of exercise physiologists. The aim of this review is to debate the role of exercise physiologists in talent identification, training and monitoring performance in sports.

## Talent Identification in Sports

Success in national and international sports competitions is considered an achievement and honor as a human. Important events like the Olympic Games which are followed by many of people around the globe are opportunities for a nation to gain recognition and prestige worldwide. Many nations have accepted, media and people that the Olympic medal is considered as a nation's success.<sup>10</sup> Therefore, success in the Olympic Games, and other international events, has given priority by many countries around the world. Many nations and non-government organizations (NGOs) thus invest on elite athletes to gain prestige and recognition by achieving success in Olympic Games, and other international events.<sup>10</sup> Thus, investors pay attention to the athletes with

the potential for successful performances at international events. The determinants of success in sport may facilitate the identification of talented athletes. The sport policy makers must allocate coaches; provide sporting facilities and long-term funding planning to nurture the talented sports persons.

Identification of talent in sport is the process of recognizing young participants having the potential to become elite athletes in future. The usual procedures for identifying young people having potential in sports performance have some limitations and thus, potential talent is often overlooked.<sup>11</sup> The talent identification process is performed by detecting the factors that can determine sports performance and predict the potential of future performance.<sup>12</sup> There are two major processes for identifying talented athletes: (a) natural selection, and (b) scientific selection.<sup>1</sup> 'Natural selection' aims to identify young people participating in a sport event due to the recognition of performance. The 'natural selection' processes rely on talented individuals who may excel in sports, even though the involvement is purely from peer or parental interests or of the sport's popularity. Often, the facilities, time, funding, and support staff required for the long-term development of all the athletes is unavailable; thus, some selection must occur. On the other hand, young sports persons are less interested in less popular sports, even though they have higher potential in these sports events. However, the ability of coaches to identify sports talent should not be underestimated. Due to this drawback, 'scientific selection' processes is considered for identifying potential in sports. 'Scientific selection' is a process by which sports talent identification is performed by testing individuals on values. The experts in these disciplines scientifically evaluate the determinants of success in sports.

The determinants of sports performance are morphological (anthropometric), physical fitness, physiological, psychological and social attributes, and technical abilities.<sup>13</sup> In this process the criteria of elite athletes is identified through scientific research, and the optimum levels of fitness variables are fixed. The talented individuals are then targeted and the determinants are matched with the elite sports persons. Once the individuals are identified, they provide the appropriate environment for nurturing their talent. The early detection of sports talent has been given priority in modern-day sport.<sup>1</sup> The 'scientific selection' process for talent identification reduces the time the selected individual requires to reach high level of sports performance. This helps the coaches to provide effective training to those athletes with superior abilities, which may increase competitiveness among the athletes aiming to reach high-level of performance. This process also increases the confidence level of the athletes, as their performance determinants are known than other athletes of the same age who did not go through the selection process. The 'scientific selection' process also helps to build a stronger and homogenous team capable of international performance at a higher level. The Exercise Physiologist plays a crucial

role in talent identification and monitor athletes training by observing the performance determinants at regular intervals.

The 'scientific' talent identification process has led many nations to look at strategies being employed by countries that gained success in important international sports competitions. However, limited research has been noted on performance determinants in sports for talent identification.<sup>10</sup> It has recommended that the use of a mixture of natural selection process whereby a sports person is selected through a competitive performance or identification by coach; followed by a scientific selection method by which the sportsperson is selected through a series of tests that reflect the performance ability for a given sport when identifying sport talent.<sup>11,12</sup> When implementing talent identification process, emphasis must be given on population size, supporting staff, sports equipment facilities, sports infrastructural development, and the link between school and community sport, availability of funding, etc.

Talent identification must be followed by the talent development in order to direct those young potential athletes towards elite athletes.<sup>13</sup> For sport talent development, young potential athletes should be provided a suitable learning environment so that talent potential can be realized.<sup>13</sup> The universities can develop effective sports talent by encouraging and supporting sports participation by students. Government and NGOs may help the universities establish a center of excellence in sports, managing the University sports facilities, programs and events.<sup>10-12</sup> Creating a suitable sporting environment to nurture the young potential athletes plays a role in the development of the athletes.<sup>12,13</sup> The players should be given a suitable learning and training environment so that they have the opportunity to realize their potential.<sup>10</sup> In the centre of excellence, the provision of coaches, supporting staff, scientific assessment, equipment, training, practice and competition facilitate the athlete's development.<sup>10,11</sup>

The essential requirement for developing top level athletes is the availability of qualified and experienced coaches.<sup>14,15</sup> The quality of training depends on the experience of the coaches. The qualified and experienced coaches create a training environment that produces athletes' success. On the other hand, coaches with poor technical or theoretical knowledge and lacks experience may not be able to direct the training program and therefore, the athlete may not reach his or her potential.<sup>14,15</sup> Emphasis must be given for high-quality coaching and education so as to attain high level performance.<sup>16</sup> Quality training facilities and equipment create a positive environment that encourages proper training and thus helps athlete's development; however, lack of facilities and equipment is a limiting factor to sports development.<sup>13</sup> In addition, exposure to competition plays a crucial role in the development of an athlete.<sup>10-12</sup> It also provides a focal point for training and important motivation for daily training if provided at the right level and frequency.<sup>13</sup> On the contrary, lack of exposure to quality competition may

reduce the potentiality of the talented athletes.<sup>10,13</sup> Effective motivation is also required for talented athletes to develop their full potential.<sup>10,13</sup> High levels of motivation are necessary to produce repeatedly for high quality performance.<sup>10</sup>

### Sports Training

Sport and exercise training focuses on performance development in a particular sport. Sports training is a process of preparation of sports persons based on scientifically based training principles aiming to improve and maintain higher sports performance. The specific type of training is designed to improve fitness and ability to perform in a given sport. This includes endurance, strength and power, flexibility, corrective, and conditioning training. Training process also includes nutritional values, and mental and psychological sessions.<sup>1</sup> Physical and mental training helps to manage stress and anxiety in sports. The objectives of sports training are as follows.

**Improvement of physical fitness:** The sport performance depends upon a sportsperson's physical fitness. Specific type of physical fitness is required for each and every sport activity. Therefore, improvement of different components of physical fitness such as endurance, strength, power, speed, flexibility, balance and coordination are important.<sup>6-8</sup>

**Improvement of skills:** The sports skills include motors and basic movement skills. The fundamentals of motor skills are important for the development of sport-specific skills. Each sports activity involves specific movement pattern, known as technique, which is needed for skill development. The motor skills like hopping, jumping, skipping, kicking, throwing, catching and striking are necessary for sport-specific skills in different sports such as football, hockey, volleyball, basketball, gymnastics, tennis, badminton, cricket etc.<sup>6-8</sup>

**Improvement of tactics:** The tactical training is based on various strategies and analysis of the tactics of the opponents. The motto of the training programme is to develop three types of tactics: offensive, defensive and high performance.<sup>6-8</sup>

**Improvement of mental abilities:** The mental abilities are important for high level performance in sport. The training sessions aimed to develop the positive attitude, competitiveness, dedication and devotion towards a particular sport.<sup>6-8</sup>

### Methods of Sports Training

The training methods are different types of training to improve fitness of the sports persons. The training methods are specific to the individual athlete, fitness component and type of sports. Those interested in improving strength and power may use weight or plyometric training whereas someone interested in improving their cardiovascular fitness may use continuous, fartlek, or interval training.<sup>17</sup>

**Continuous training:** Continuous training in which a minimum of 30 minutes of sub-maximal exercise is performed (60-80% maximum heart rate ( $HR_{max}$ )) for the development of cardiovascular fitness. This type of training is useful for running, walking, Swimming, cycling,

team games like football, hockey, basketball etc.<sup>1,17</sup>

**Fartlek training:** The word 'fartlek' is a Swedish word that means 'speed play'. Fartlek training is a continuous form of training in which there is a combination of speed and endurance. In this type of training, both aerobic and anaerobic exercise can be performed. The fartlek training helps the body to adapt to various speeds, conditioning the body to become faster over a longer distance. It develops a range of components and is used by games players.<sup>1,17</sup>

**Interval training:** Interval training aims to develop endurance, speed and strength. In the type of training a, periods of intense work is interspersed with timed rest. The intense activities may be increased as much as 100% of  $HR_{max}$ .<sup>1,17</sup>

**Weight training:** Weight training is employed to develop the strength and muscular endurance of the sportsperson. The intensity is measured in % 1 rep max. Time is structured in repetitions and sets with specific timings for recovery between sets. Load above 70% of 1 REPmax is used for 4-8 repetitions to develop strength. On the other hand, to develop muscular endurance, loads below 70% 1 rep max is used for 12-15 repetitions.<sup>1,17</sup>

**Plyometric training:** It aims to develop the athlete's power. This involves high-intensity exercise with explosive movements. The muscle is lengthened and then shortened to develop the explosive capability of the muscle.<sup>1,17</sup>

**Flexibility training:** The training helps develop athletes' flexibility. It is essential for all athletes in all sports and activities. Static stretching can be carried out where the athlete holds a stretch and time is measured by the length of hold and the recovery period between holds. Intensity is measured as a percentage of range of motion (% ROM).<sup>1,17</sup>

**Circuit training:** Circuit training is employed to develop muscular endurance and strength. This is an interval form of training in which aimed to develop cardiovascular fitness.<sup>1,17</sup>

**Cross Training:** This type of training uses a combination of different types of exercise activities to improve overall performance. Workouts without some variability increase the risk of sustaining an injury from repetitive strain or overuse. Thus a variety of exercises is included to improve fitness and effectiveness of the training process.<sup>1,17</sup>

### Principles of Sports Training

Training must be related to the goal, which is refers to as the training principle of specificity. The aim of training is to improve the performance of the sportspersons by employing various levels of activities. For that one must understand the principle of sports training.<sup>1,17</sup>

**Specificity:** The observation that fitness/performance improves through training movement patterns and intensities of a specific type of exercise (strength, power, endurance, or flexibility).<sup>18</sup> Incorporating exercise to a sport person will induce neuromuscular and metabolic changes to that increase specific fitness of the exercising muscle groups.<sup>19</sup> Training is for improving the sports persons' fitness and/or performance.

**Overload:** The effects of training are observed only when the exercise is given at a level beyond which it is normally given, which is known as overload. It challenges the current fitness levels of the athlete, and induces compensatory improvements.<sup>9,18</sup> The body systems are continually loaded with progressively higher levels of exercise. The body adapts physiologically when training load is higher than it is used to. Overload can be achieved by varying frequency, intensity, duration. The method used to achieve overload is dependent on the specific fitness desired and the aim of the training program.

**Periodization:** The periodization is a planned systematic and structural variation of a training program over time.<sup>17-19</sup> There is a cyclic change in training variables (frequency, intensity, duration) a training session. The cycles are known as microcycles, mesocycles, and macrocycles. These changes are taken place in each day, week, and month to maintain the training stimulus. Individual differences are considered while making the changes to avoid overtraining, injury, and burnout.<sup>17-19</sup>

**Individual differences:** Individuals will respond to the same training in different ways. Each individual responds in a different way in same exercise load. The factors which may affect the training responses are: age, level of fitness, training history, motivation,

*concentration, confidence level, anxiety self-confidence, emotional control, environmental conditions, nutritional status, lifestyle habits, and genetic inheritance.*<sup>18</sup> Optimal benefits result from programs geared to the individual needs and capabilities of the athlete.

**Adaptation:** The progressive overload is given to achieve the desire goal in performance/fitness. The scientific way of increases in training stimulus is adjusted at tissue level, this is known as training adaptation.<sup>18</sup> There is a need of an increase in training variables (frequency, intensity, and volume) for further development in fitness/performance.<sup>18</sup>

**Reversibility:** The training-induced adaptation may be reversed with the withdrawal of the training load, which may result in decrease in performance.<sup>9</sup>

### Monitoring of Performance in Sports

The performance of the sports persons depends on number of factors. These include scientific coaching, knowledge of athletes and support by the sports scientists.<sup>9</sup> The athlete reacts to the training stimuli and the responses are collected through a scientific process which may predict the performance of the sports persons.<sup>6</sup> Exercise physiologists monitor the changes in various systems of the body during the exercise training protocols. The coaches require scientific assistance to ensure the training objectives.<sup>20</sup> Assessments of physical and physiological variables significantly impact the monitoring of training and performance of the sports persons. These variables also indicate the limitations of an athlete's performance.

### Physical Characteristics

The physical characteristics have a significant impact on the performance of the sports persons.<sup>5</sup> The physical characteristics of the athlete are indicated by anthropometry and body composition that varies with age, gender, heredity, ethnicity and nutritional status. According to the physical characteristics, the sports persons are selected in different types of sports and different playing positions.<sup>8</sup> Body composition depends on body fat, bone remodeling, endocrine functioning, nutritional status and level of physical fitness.<sup>21</sup> Body composition indicates the athletes' overall health that influences sports performance and the injury risk.<sup>22</sup> The lower body fat is helpful for higher athletic performance.<sup>21</sup> Body composition changes over a season because of training load and dietary status.<sup>4,22</sup> It has been noted that excess body fat has a negative impact on sports performance.<sup>8,23</sup> Excess body weight in fat may increase the risk of injury when performing difficult skills. It has been reported that the body fat of professional players reduced due to intense training and increased when the training load is low.<sup>24</sup> The endurance training has been considered the possible reason for reducing body fat.<sup>8,23</sup> Monitoring physical characteristics are important for talent identification, training, and performance of the sports persons.

### Muscle Functions

The muscle functions are important in sports activities which are measured as power and strength. The ability to exert force on an external object or resistance is expressed as muscular strength.<sup>8,9</sup> Higher muscular strength can enhance the ability to perform sport skills such as jumping, sprinting, kicking etc.<sup>7</sup> The higher level of muscular strength also diminishes the risk of injury when performing this skills.<sup>25</sup> Sport scientists monitor the strength characteristics of the sports persons using different strength tests.<sup>1</sup> The demands of muscular strength vary in different sports disciplines.<sup>20,25</sup> The power output is one of the important characteristics of sports where force and speed of movement is applicable. This type of actions requires high anaerobic energy systems with fast-twitch muscle fibres dominance.<sup>8</sup> Assessment of power output is performed by laboratory and field tests.<sup>9</sup> The demands of power output are varies in different sports activities e.g. throwing, jumping and running etc.<sup>9</sup> In team sports such as soccer, hockey, volleyball, basketball and rugby, complex demands is required which enable the players to perform explosive actions during sports activates.<sup>26,27</sup> Athletes are exposed to strenuous strength and power training showed improvement in these variables.<sup>9</sup> A long term training programme is required to develop the strength and power of the athletes.<sup>1</sup> Studies have reported that strength and power increased following a training programme.<sup>24</sup> Regular monitoring of strength and anaerobic power are essential as these parameters are used for the identification of sports talent, training, and performance of the sports persons.

## Metabolic demands

The blood lactate level has a link with the metabolic demand of the sports persons performing endurance exercise<sup>7</sup>. Blood lactate is produced as a by-product of anaerobic glycolysis in skeletal muscles.<sup>21</sup> During high-intensity exercise, blood lactate level increased many times above the resting value. This raises the blood's hydrogen ions (H<sup>+</sup>) concentration and reduces muscle pH. The blood lactate which is accumulated in the muscle is removed through an oxidation process within the muscle fibre or in the liver. Lactate is converted back to pyruvate in the presence of oxygen, which can be converted into glucose, and the later is metabolized by exercising muscles or stored in the muscles as glycogen.<sup>8</sup> In elite athletes, less lactate to the blood is produced during exercise than the sedentary control individuals. At the same time the removal of blood lactate is faster in well trained athletes than untrained subjects.<sup>7</sup> The lactate threshold (LT) level is an indicator of endurance capacity.<sup>21</sup> The LT is the point from which blood lactate concentration increases at a rapid rate. The LT may be achieved at 85% of maximum heart rate (HR<sub>max</sub>) or 75% of maximum oxygen intake (VO<sub>2max</sub>). It is observed that intensive exercise produces high level of blood lactate.<sup>9</sup> Scientific sports training can sift the lactate threshold and delay the onset of muscle soreness.<sup>3,21</sup> High level of blood lactate levels were reported in Indian elite athletes (boxing-  $9.9 \pm 1.5$  mmol l<sup>-1</sup>), indicating a high level of performance by the athlete.<sup>28</sup> With training, athletes build up the ability to tolerate higher-intensity exercise for longer periods of time. The lactate threshold training is the exercise intensity above the LT heart rate. The interval, high-intensity, and continuous steady-state training may improve the LT.<sup>3,21</sup> It has been noted that elite Indian male swimmers showed that a 12-week training programme reduced resting blood lactate (before training:  $2.8 \pm 0.4$  mmol l<sup>-1</sup>; after training:  $2.2 \pm 0.5$  mmol l<sup>-1</sup>) and peak blood lactate (before training:  $7.1 \pm 0.4$  mmol l<sup>-1</sup>; after training:  $6.5 \pm 0.5$  mmol l<sup>-1</sup>) concentration.<sup>29</sup> Regular monitoring of blood lactate concentration is essential for assessing training intensity.<sup>8</sup>

## Maximum Aerobic capacity (VO<sub>2max</sub>)

Maximum aerobic capacity (VO<sub>2max</sub>) is the measurement of the maximum amount of oxygen a person can utilize during exhaustive exercise.<sup>8</sup> It reflects the cardio-respiratory fitness of the sportsperson. An improvement in VO<sub>2max</sub> indicates that the athletes can perform the exercise without undue fatigue. Fatigue results in impairment in performance and increased risk of injury.<sup>7</sup> Thus decrease in VO<sub>2max</sub> values may reduce endurance performance. Elite athletes, such as distance runners, cyclists, and cross-country skiers, achieve VO<sub>2max</sub> values of approximately 80 (mL kg<sup>-1</sup> min<sup>-1</sup>).<sup>9,23</sup> It has been reported that elite soccer players have VO<sub>2max</sub> values in the region 55–70 (mL kg<sup>-1</sup> min<sup>-1</sup>).<sup>30</sup> This indicated the high aerobic demand of the top-level soccer players. Field hockey is played on a similar-sized pitch with the same number of players, and has similar aerobic demands like soccer.

Physiological demands of field hockey are close to soccer. The elite volleyball players have VO<sub>2max</sub> values of 54–56 (mL kg<sup>-1</sup> min<sup>-1</sup>), which are lower than elite marathon runners or cyclists (80–85 mL kg<sup>-1</sup> min<sup>-1</sup>).<sup>31</sup> It has been reported that the elite male basketball players pose a VO<sub>2max</sub> value of 50 (mL kg<sup>-1</sup> min<sup>-1</sup>).<sup>26</sup> It has been seen that Indian soccer players have higher VO<sub>2max</sub> values than field hockey, volleyball, and basketball players, which indicates a high aerobic demand of soccer.<sup>24,32–35</sup> Studies also reported that the junior players (under 19 yrs) possessed higher VO<sub>2max</sub> than senior players (30 yrs and above). It has been noted that maximal heart rate (HR<sub>max</sub>) decreases with age, and this reduces cardiac output and oxygen availability in the muscles which may be the possible reasons for age-related decline in VO<sub>2max</sub>.<sup>8,9</sup> Studies have shown that VO<sub>2max</sub> increased in players following aerobic endurance training.<sup>26,31</sup> A former study examined the effects of 12 weeks of training on VO<sub>2max</sub> values of soccer players, reported that VO<sub>2max</sub> values increased following a training programme.<sup>24</sup> Effects of training on VO<sub>2max</sub> values were also observed in other sports persons viz., field hockey, volleyball, and basketball players. The results showed an improvement in VO<sub>2max</sub> following training.<sup>32–35</sup> The increased VO<sub>2max</sub> helps the players to perform high aerobic endurance performance. The possible reason for increased VO<sub>2max</sub> after training might be increased systemic a-vO<sub>2</sub> difference and stroke volume.<sup>6,7</sup> The possible reason for the elevation of VO<sub>2max</sub> after a sports training is that endurance training increases the cardiovascular activity and oxidative capacity of the muscles which may enhance the oxygen delivery to working muscles.<sup>6,7</sup> The increase in VO<sub>2max</sub> is also dependent on the initial level of fitness.<sup>6,7</sup> However, the upper limit of increase in VO<sub>2max</sub> is also dependent on genetic factors.<sup>8,9</sup> Regular monitoring of VO<sub>2max</sub> during training helps the players to improve their performance and coaches to select players for competition.

## Cardiac function

The cardiovascular response to exercise is assessed by heart rate, which increases with increase in work load.<sup>9</sup> Monitoring of heart rate during rest, maximal exercise and recovery is important in sports.<sup>9</sup> The adaptation to sub-maximal and maximal exercise performance can be monitored using heart rate responses.<sup>36</sup> A telemetric heart rate monitoring system is used for continuous monitoring of heart rate during sports. A study reported maximal heart rate (HR<sub>max</sub>) ( $181.7 \pm 4.6$  and  $185.8 \pm 3.7$  beats min<sup>-1</sup>) and recovery heart rates ( $151.6 \pm 3.3$  and  $162.7 \pm 7.8$  beats min<sup>-1</sup>) of Indian senior and junior soccer players respectively<sup>24</sup> indicating that the HR<sub>max</sub> decreases with age and thus may limit the performance of players.<sup>8</sup> The possible reason for age-related decline in HR<sub>max</sub> is that with aging, the SA node's spontaneous electrical activity may decrease, which may reduce the heart's contractility and lower heart rate.<sup>8</sup> Thus, heart rate measurement during training can be used to assess sports performance. A study conducted on Indian boxers showed higher heart rate value during boxing rounds than exercise

on treadmills, which may be due to game-related stress and different muscle groups involved in boxing, indicating a high demand of the game.<sup>28</sup> Heart rate monitoring can give useful information for match analysis and help in the assessment of training load. Research findings also showed that heart rate was greater when the match went to 3<sup>rd</sup> and 4<sup>th</sup> rounds, indicating that boxers required high cardiovascular fitness.<sup>28</sup> Sports training can improve cardiovascular fitness by keeping lower heart rate during exercise and a faster fall of heart rate during recovery.<sup>37</sup> Sympathetic activation and parasympathetic inhibition are considered as the main cause of the exercise-induced increase in heart rate.<sup>6,7</sup> Nevertheless, parasympathetic activation is considered to be the main mechanism underlying exponential cardio deceleration after exercise.<sup>6,7</sup>

## CONCLUSION

Exercise Physiologists play a significant role in talent identification, assessment of training load and monitoring of performance of the sports persons. Assessment of physical and physiological variables of young children when they show interest in sports helps of the identification of talent in sports. Upon selection, the children undergo training, which needs a scientific approach based on the physiological profiles of the players. Sports training improves the players' performance when given according to the principles of periodization. Monitoring physical and physiological variables regularly during training helps to understand the training-induced adaptation in different body systems. The physical and physiological variables are also monitored during sports or matches, which helps in the analysis of the performance of the players.

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