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RELATIONSHIP BETWEEN SPRINT TIME, CARDIOVASCULAR FITNESS AND sRPE DURING IN-SEASON'S TRAINING AMONG PROFESSIONAL SOCCER PLAYERS

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ABSTRACT

The purpose of this study was to examine the relationship between sprint time, cardiovascular fitness and session's rate of perceived exertion (sRPE) among the professional soccer players during the seventy sessions of in-season's training. Thirty participants who officially registered as Perbadanan Kemajuan Negeri Perak Football Club professional soccer players participated in this study. The quasi-experimental research design was used and the data were collected during actual in-season training sessions from December 2016 to April 2017. Sprint time performance was determined by using the 20m sprint test and the 20m Yoyo Intermittent Recovery Test Level 1 was used to determine the cardiovascular fitness level of the players. Ten scales rating for the sRPE was asked at the end of each training to determine the self-perception intensity of the players. Pearson Correlation was used to analyze the empirical data. The result showed a moderate but negative significant correlation between sprint time performance and sRPE ($r=-0.36$, $p<0.05$). In terms of the relationship between cardiovascular fitness performance and sRPE, the data showed a significant moderate positive correlation ($r=0.48$, $p<0.05$). In conclusion, the main results indicated a negative correlation between sprint time and sPRE and a positive correlation between cardiovascular fitness and sPRE. The implication of this study is that sprint time and cardiovascular fitness are pertinent for professional soccer players.

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PERKAITAN ANTARA MASA PECUTAN, KECERGASAN KARDIO-VASKULAR DAN KADAR TANGGAPAN INTENSITI SETIAP SESI DALAM KALANGAN PEMAIN BOLA SEPAK PROFESIONAL SEWAKTU LATIHAN DALAM MUSIM

ABSTRAK

Kajian ini bertujuan untuk menyelidik perkaitan antara masa pecutan, kecergasan kardiovaskular dan kadar tanggapan intensiti setiap sesi (sRPE) dalam kalangan pemain bola sepak professional sewaktu tujuh puluh sesi latihan dalam musim. Tiga puluh peserta yang berdaftar secara rasmi sebagai pemain bola sepak professional Kelab Bolasepak Perbadanan Kemajuan Negeri Perak telah menyertai kajian ini. Kajian ini dijalankan dengan kaedah ambilan data-data berkaitan sewaktu program latihan dalam musim yang sebenar daripada Disember 2016 hingga April 2017. Reka bentuk penyelidikan kuasi-eksperimen digunakan dan prestasi masa pecutan ditentukan oleh ujian masa 20m pecut dan 20m *Yoyo Intermittent Recovery Test Level 1* (YYIR1) digunakan untuk menentukan tahap kecergasan kardiovaskular semua pemain. Penarafan sepuluh skala sRPE ditanyakan pada setiap akhir sesi latihan dan ujian kecergasan bagi mengenalpasti tahap intensiti persepsi kendiri pemain. *Pearson Correlation* digunakan untuk menganalisis data empirikal. Hasil menunjukkan perkaitan signifikan yang sederhana tetapi negatif antara prestasi masa pecutan dan sRPE ($r=-0.36$, $p<0.05$). Dari segi hubungan antara prestasi kecergasan kardiovaskular dan sRPE, data menunjukkan perkaitan signifikan positif yang sederhana ($r=0.48$, $p<0.05$). Kesimpulannya, hasil utama menunjukkan perkaitan negatif antara waktu pecutan dan sPRE dan perkaitan positif antara kecergasan kardiovaskular dan sPRE. Implikasi kajian menunjukkan bahawa masa pecutan dan kecergasan kardiovaskular adalah relevan bagi pemain bola sepak profesional.

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LIST OF ABBREVIATION

sRPE	Session's rating of perceived exertion
YYIR1	Yoyo Intermittent Recovery Level 1 test protocol
PKNP FC	Perbadanan Kemajuan Negeri Perak Football Club

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CHAPTER 1

INTRODUCTION

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1.1 Introduction

Soccer has been known as one of the prestigious and popular sports in the world. Most of the professional soccer players are highly paid based on their ranking and performances (Andreff & Staudohar, 2000; Dobson & Gerrard, 1999; Pedace, 2008). The best performance demanding a high contribution in terms of positive attitude and discipline, individual technical ability, individual skill, individual tactical ability, team tactical adaptation, and on top of the others is the physical conditioning preparation.

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1.1.1 Importance of Physical Conditioning in Soccer

Player's physical conditioning is one of the important factors that influence the outcome of the match. The readiness of the players to perform at high-level performance has a bigger influence in an individual capacity and collectively in a team capacity. There was a significant relationship between an average jump height performed by a player with team success and this shows that there is a needs to maximize the individual physical conditioning ability to influence the team's success (Arnason, 2004). A physical conditioning preparation relies a lot on the current physical performance status of the players, and the next status aimed by the players and coaches. To produce a greater positive impact on performance, a sequence of training module needs to be followed. The well-planned training program can produce performance enhancement and decreasing the risk of injury (Gabbett, 2016).

1.1.2 Importance of Player's Performance Monitoring

On top of that, nowadays, most of the elite soccer team practically used performance monitoring tools to make sure their training program is on the positive track (Buchheit et al., 2013; Thorpe et al., 2015; Wehbe, Gabbett, Dwyer, McLellan, & Coad, 2015). The importance of the player's performance monitoring has been widely discussed and accepted in soccer to ensure players are ready to perform at their maximum performance ability (Akubat & Van Winckel, 2014). The club or team performance is usually reflected in the player's performance throughout the season. Hence, the progressive and a series of player's performance assessment or fitness testing need to

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be conducted. The outcome from a block of the training program is normally measured by fitness testing protocols conducted after a certain period, whereas daily basis immediate responses typically assess by daily or session's rate of perceived exertion scale (sRPE).

Besides that, massive marketing and publicity on the technology related to training load monitoring tools for sports programming of training (Wehbe, Hartwig, & Duncan, 2014), has to lead to awareness on the importance of training load measurement among coaches, making it as a part of the coach's main consideration when evaluating their training program (Brink, Nederhof, Visscher, Schmikli, & Lemmink, 2010). The training load monitoring system also can assist the coaches in terms of revealing the indicator or factors that might influence the rate of injuries, as the increasing the training and gameplay intensity leading up the injuries (Ehrmann, Duncan, Sindhusake, Franzsen, & Greene, 2016). Proper measurement and monitoring systems, therefore, ensure the possibility of updating training programs based on current accurate feedback for better performance enhancement or adjustment.

1.1.3 Importance of Fitness Testing in Soccer

There were a few different approaches to identify the player's and team's fitness performance. Two different natures of fitness testing which is a field test or laboratory test can be conducted to determine the player's fitness performance. Monitoring fitness performance regularly can be done mainly via two ways that are either by

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laboratory-based tests or more practical by field-based tests such as yoyo endurance test and yoyo intermittent recovery test for determination of aerobic capacity and aerobic-anaerobic power of the players (Castagna, Impellizzeri, Chamari, Carlomagno, & Rampinini, 2006). Studies have found that such field-based tests are significantly correlated with laboratory-based tests, giving assurance that VO_2max result on laboratory treadmill running is not significantly differed with soccer-specific field test such as maximum speed endurance running test, yoyo intermittent endurance test, yoyo intermittent recovery test, and 20m multistage bleep test (Bulder, Moen, Weir, Bakker, & Tol, 2011; Chamari, 2005; Daros et al., 2012). Even though in some study show the indirect calculation to estimated VO_2max is at high correlations with a direct test to determine VO_2max, there was a limitation of laboratory facilities need to be taken into consideration, as not all soccer team has easy access to an accredited sports laboratory lab, hence simple and practical test need to be used and decided for the team which resulted in more usage of alternative field-based tests (Da Silva, Guglielmo, & Bishop, 2010).

No matter what, as experienced by the researcher himself, decisions on types of tests to be utilized relies heavily on strength and conditioning coaches and their discussions with the head coach.

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1.2 Background of the Study

Football injuries have been estimated to occur in approximately every ten to thirty-five from 1000 playing hours and the majority of the injuries are on lower extremities which are knees and ankles (Dvorak & Junge, 2000). Most of the injuries were on the knee and ankle but there were also reported head and shoulder injuries. Muscle strain from the sprinting, sprain from the tackling and false landing, contusion caused by physical contact is a common injury in soccer and it showed the team who had a proper and more time in pre-season can suffer less injury (Arnason, Gudmundsson, Dahl, & Jóhannsson, 2007; Junge & Dvorak, 2004; Longo et al., 2012). Therefore, to prevent injuries that can be detrimental to the performance, a systematic training program inclusive with proper progress tracking or monitoring system is required.

1.2.1 Physical Conditioning Specific to Match Demand

Soccer's pattern of play and team tactical formation has evolved exponentially over the years. Most of the elite soccer team starts to adapt to a faster tempo and high pressing game. The game passing rate increase in 35% with a playing structure changed towards a higher player density meanwhile the game speed also increases by 15%, with players start to regain the ball in the shortest time once losing it (Wallace & Norton, 2014). This no doubt leads to the need for a higher level of fitness level from all players. Without an outstanding physical conditioning preparation, the high tempo pressing game with a minimal time of recovery cannot be performed. Soccer nowadays considered as high intensity and high duration intermittent sports, which

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required speed and strength, for example, a great movement of jumping and sprinting need to be performed and all of this movement or activity result in muscular microtrauma which can delay player's recovery and training performance (Coelho et al., 2013). With more competitive gameplay, the physical training programs itself evolve dramatically. Whatever is presented in a match is a reflection of the preparation done in training. Coaches need to plan their training program based on the progressive overload principle, where loading was prescribed progressively following the athlete's level and capacity at that time (Brown & Greenwood, 2005; Kraemer & Ratamess, 2004; Stand, 2009).

1.2.2 Importance of Speed in Soccer

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Sprinting becomes more important in modern soccer. Most of the professional players perform a straight or linear sprinting before scoring a goal and it becomes a most frequent movement or action. The performance level of the players is distinguished through sprint velocity either in acceleration and maximal sprinting speed embedded with certain agility skills and repeated sprint ability (Haugen, Tønnessen, Hisdal, & Seiler, 2014). In an intermittent team sports event including soccer, the importance of sprinting ability is hardly express as one of the keys or the main factor contributing to fitness performance (Dardouri et al., 2014).

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1.2.3 Importance of Speed Endurance in Soccer

Speed endurance production and speed endurance maintenance is a soccer-specific physical performance training drill. Both drills respectively improved the distance covered in the Yo-Yo Intermittent Recovery Test level 2 after 3 weeks of training. Speed endurance production improved the repeated sprint ability and high-intensity intermittent performance whereas speed endurance maintenance training drill improved fatigue tolerance in speed ability during performing repeated sprinting and maximum continuous short-duration sprinting (laia et al., 2015). Speed endurance training improved the ability of professional soccer players to perform a repeated high-intensity drill or exercise (Nyberg et al., 2016). In a modern soccer match, it's demanding a player to perform a high-speed repeated sprinting in a short distance and at the same time, this movement needs to be consistently performed at a high pace throughout the match.

1.2.4 Fitness Testing and Performance Monitoring Program

There is a different perception of how hard the training is (termed dose-response) between coaches and players (Brink, Frencken, Jordet, & Lemmink, 2014). While the coaches may think that the training is easy for the players, the players themselves may think and feel otherwise. Most of the current tests prescribed for performance monitoring can be classified as external in nature, meanings they are external to the athletes, which is the intensity performed by the players is evaluated from the heart rate monitoring, GPS monitoring, or fitness testing, not from the player's perception

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or self-evaluation (Lovell, Sirotic, Impellizzeri, & Coutts, 2013). However, with many studies on prescribed training load and effect on performance, a method called session's rate of perceived exertion or sRPE has been created and validated, in which it is internal in nature or more towards self-perception or evaluation on the individuals own performance (Comyns & Hannon, 2018; McGuigan & Foster, 2004; Turner, Bishop, Marshall, & Read, 2015). The external evaluation of training intensity and internal self-perception or evaluation of training intensity needs to be closely monitored and complement each other to ensure the training program is progressive towards the upward and positive track.

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1.3 Problem Statement

The soccer head coach or physical conditioning coach needs to practice a training program that specific to the matching demand and verify the effectiveness of the training program either in an acute or chronic stage. Currently, limited study and published data in the area of performance monitoring in the Malaysian soccer league.

The variation of the training program resulted in a different perspective of the outcome. As mention earlier, the specific soccer match demands need to be incorporated in every training program since the speed endurance, and high aerobic capacity are needed in a modern soccer match, and most of the professional soccer players performed (Iaia et al., 2015). Highly trained or professional soccer players improved in repeated high-intensity work rates with extra training on speed endurance and this indirectly assists them to perform a better soccer play in a real match (Nyberg

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et al., 2016). The training that lasts from 30 seconds to 4 minutes in high intensity improved in speed endurance and when embedded with high-intensity aerobic training can enhance the performance and respectively delay fatigue development, reduced energy expenditure in high-intensity exercise and this intensified training action benefits a team sports as soccer team (Bangsbo, 2015).

That is the reason to support the current soccer training need to implement and incorporate the speed endurance training in their training program to ensure the demands of the modern soccer match is fulfilled. However, most of the previous study was result in a specific treatment or training program given to produce specific finding needs. It is crucial to examine or look into the actual case study that is implemented on professional soccer players without given a specific or separated training program or treatment. Hence, the actual training program implemented in the professional soccer team needs to be examined based on the actual case study.

To produce a great result, it is not only focusing on how or what the training is implemented, but it also needs to consider how to monitor the training load given and how to evaluate the outcome of the training provided. A practical and relevant training monitoring method needs to be considered. The quick and direct measurement of intensity 20 minutes after every training session needs to be considered as it reflected the training session achievement. As discussed earlier, the external or internal evaluation can be used to determine the training intensity, but the most important factor to consider is the practicality and cost-effectiveness. The simple and practical method with fewer cost expenses benefited the professional soccer team.

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Performance monitoring can be conducted throughout the season or just focusing on the pre and post of the season. It depends on the demands and needs of the team head coach (Los Arcos & Martins, 2018). As mention earlier, most of the study conducted was prepared with the intervention or treatment or specific procedure and protocol which interrupted the actual practice and application in a professional soccer team, hence, this study needs to be conducted in an actual study case to identify and examine the actual practice in a professional soccer team in performance monitoring program and the outcome of this study can elevate the value of understanding and realistic.

1.4 Purpose of the Study

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The main purpose of this study is to examine the relationship between sprint time, cardiovascular fitness, and session's rate of perceived exertion (sRPE) on the PKNP FC professional soccer players during an in-season performance monitoring program.

1.5 Research Objectives

The objectives of the study are as below:

a) To examine the relationship between sprint time, cardiovascular fitness, and sRPE.

b) To examine the relationship between sprint time and cardiovascular fitness.

c) To examine the relationship between sprint time and sRPE.

d) To examine the relationship between cardiovascular fitness and sRPE.

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e) To examine the player's sprint time performance throughout in-season training.

f) To examine the player's cardiovascular fitness performance throughout in-season training.

1.6 Research Questions

The research questions that need to be answered by this study are as below:

a) Will there be a significant relationship between external-based performance assessment (sprint time and intermittent cardiovascular fitness level) with internal based assessment (self-perception of intensity based on sRPE) among PKNP's professional soccer players during in-season's training session?

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b) Will there be a significant relationship between external-based performance assessment (sprint time and intermittent cardiovascular fitness level) among PKNP's professional soccer players during in-season's training sessions?

c) Will there be a significant relationship between external-based performance assessment (sprint time) with internal based assessment (self-perception of intensity based on sRPE) among PKNP's professional soccer players during in-season's training session?

d) Will there be a significant relationship between external-based performance assessment (intermittent cardiovascular fitness level) with internal based assessment

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(self-perception of intensity based on sRPE) among PKNP's professional soccer players during in-season's training session?

e) Will there be a significant improvement on external-based performance assessment (sprint time) among PKNP's professional soccer players during in-season's training session?

f) Will there be a significant improvement on external-based performance assessment (intermittent cardiovascular fitness level) among PKNP's professional soccer players during in-season's training session?

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1.7 Conceptual Framework of Research

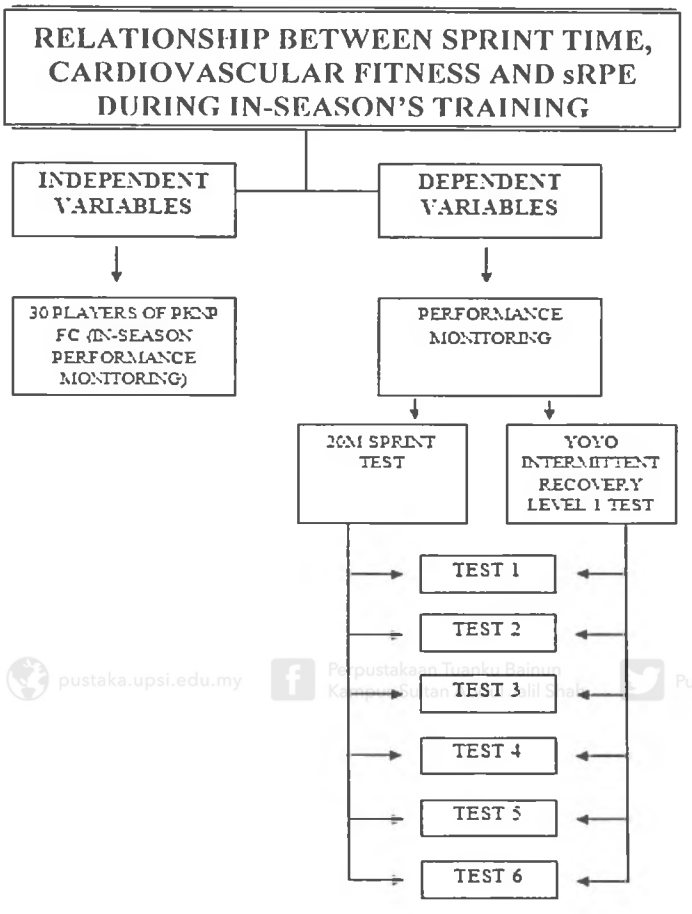


Figure 1.1 Conceptual Framework of Research Diagram

1.8 Significance of the Study

This study is significant as it shows a real-life application of performance monitoring during actual professional soccer league seasons. The overall process of this research was also an actual process on the ground applied by the researcher as the strength and conditioning coach of the team. The write-up of the process in an academic manner provided a more in-depth scientific report of the process and assisted in answering

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question arise during actual training sessions. The results of this study had also provided the team with a better understanding of related knowledge and practices, for the betterment of future season's preparation. Even though this study had focused on professional soccer players, the outcome is still valid to be used as a guideline in performance monitoring for school and other semi-professional or development teams.

For strength and conditioning practitioners, results of this study are also significant in a way that it provides evidence on how sRPE as player's perception on intensity interact with other external based assessment traditionally used.

Academically and also for policymakers at sports organizations such as the National Sports Council and Football Association of Malaysia, this study can be said as significantly important due to recorded hands-on knowledge provided, especially on the method of solving problems (research questions) via research method by practitioners on the ground. Finally, this study is significant as it can be said as the first study investigating sRPE in the performance monitoring program in an actual on-going professional soccer league in Malaysia.

1.9 Limitations and Delimitations of the Study

The study was conducted during the actual training session of the team. Factors that cannot be controlled in this study include but may not be limited to attendance of the player during a training session, current injury condition of the players, rescheduled

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training session by the head coach, and daily weather in each training session. On the other hand, the fitness testing was conducted as planned by the head coach and physical conditioning coach based on the season's schedule. Hence, the time frame or a series of performance monitoring throughout the season cannot be controlled or changed similarly to other research conducted in a pure laboratory environment. However, all of these factors had been counted for and needed to ensure the results of the study depicted actual performance monitoring by the actual team in a soccer league.

1.10 Operational Definition

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1.10.1 Speed

Speed is defined as the average distance over time. In the context of this study, the speed is defined as the average of sprint time performance of players for a 20m distance (Haugen, Tønnessen, Hisdal, & Seiler, 2014)

1.10.2 Cardiovascular fitness

Cardiovascular fitness defines the efficiency of the heart, lungs, and vascular system in delivering oxygen to the working muscles. In the context of this study, cardiovascular fitness is defined as the level of fitness being scored by professional soccer players during the 20m sprint and Yoyo Intermittent Recovery Level 1 test protocol (YYIR1) (Bangsbo, Iaia, & Krustrup, 2008).

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1.10.3 sRPE

Session's Rate of Perceived Exertion is the rating scale from one to ten which is from easy to hard to determine the intensity expressed by the players as reflected the intensity of a training program given (Foster, 2001).

1.10.4 Performance monitoring

In the context of this study, performance monitoring refers to the fitness testing conducted and the monitoring tools used to identify the intensity of the training program which is sRPE (Foster, 2001).

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CHAPTER 2

LITERATURE REVIEW

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2.1 Introduction

In this chapter, two main aspects have been discovered and expanded to support the relevance of this study. The importance of physical conditioning contribution specific to the sports and match demands, and the importance of the performance monitoring system and tools to complement the training program in achieving the maximum performance of the athletes. Soccer is a complex sport, which requires multiple performance actions in sprinting and running at high intensity, respectively (Nakamura et al., 2017). It is a game that involves various skills, strategies, tactics, and physical elements that are required for better performance, and to enhance these conditions, specialized training should be given to the players (Kadagadakai & Pradhan, 2018). The characteristics of soccer training and competition produce

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considerable inter-player differences in training load (Gil-Rey, Lezaun, & Los Arcos, 2015).

2.2 Modern Soccer Evolution

Soccer has been established as a popular sport in the world. The coverage on the sport is worldwide and can be assessed from any part of the world. Federation of International Football Association or FIFA has been estimated that two hundred seventy million people are involved in soccer from all around the globe. This amount shows the popularity of this sport. Involvement in soccer has become a culture in their life. If compared between the country, the United States Soccer Federation become number two in a ranking of the number of participants and registered soccer players and still increasing in numbers. Together with the outstanding establishment and extensive popularity in soccer, remarkable growth also can be seen in the area of sports science application and study specifically in the strength and conditioning area of interest. The scientific approach, professional practitioner, and study conducted in this area have been recognized and well develop towards a better coaching system and better vision in soccer development (Turner, 2014).

In line with the significant and popularity recognition in the soccer industry around the globe, the scientific approach with the scientific fact and view makes a soccer structure and nature more interesting and attractive. Publications on the analysis done on the well-known players attract more information query by the fans around the world (Miohk Ryoo, 2018).

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A four years contract from 2016 to 2019 with the two biggest television broadcast channels worth eight billion USD was signed by the English Premier League. This big amount is only for domestic broadcasting whereas another five billion USD generated from the international television broadcast channel deals within the same period. On the other hand, English Premier League is also published by another eighty television broadcaster over around two hundred and twelve territory worldwide which can be supported by over twelve million television viewers. Based on this figure, it can be suggested that the English Premier League can establish them as the most popular soccer league in the world. Competing with this league is a Spanish League, La Liga which can attract more than two million watching ratings in one match. La Liga top team such as Barcelona and Real Madrid prefer to deal with their television contract rather than open the selling of La Liga as a whole because they can earn more and extra money from the audience of global television. Besides that, Italian League, Serie A can attract around four and a half million viewers per match, and German League, Bundesliga can draw around two million viewers in a single match. Comparison between the rating views from all of these leagues can be suggested that soccer is one of the popular sports in a world and English Premier League leads the table of attraction in viewers (James Curley, 2016).

Besides the popularity of soccer sport among the population in the world, it has been proven that the success of a national team results from the success level of a club's team in that particular country at the international level. The points collected at an international competition that reflect on the FIFA ranking become one of the successful factors (Michael Leeds, 2009).

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2.3 Physical Conditioning Specific to Match Demand

The researchers still conducted and keep on finding a best solution and indicator that possibly can improve and enhance a soccer sports through a study on speed-endurance, explosive power, common related injuries, cardiovascular fitness performance, a system of play, player's playing position, characteristic in modern soccer demand and soccer player's attitude and respond towards training intensity.

The ability to recover and reproduce performance in sprint ability is therefore believed to be a specific fitness component of soccer which due to its high correlation with high-intensity and sprint distances during the matches (Dardouri et al., 2014). The nature of soccer includes a multi-discipline of movement, exercise, and drill, hence this method also relevant to be used in a soccer training session as it is a valid method to quantifying exercise training intensity in a wide variety of types of exercise (Foster, 2001). The study on the relationship between quantifying perceived load received by the players with the improvement in aerobic capacity and neuromuscular ability also has been conducted and it shows a significant relationship (Gil-Rey et al., 2015).

The fundamental factor in soccer overall performance is strength, speed, agility, quickness, reaction time, and power. All of these relevant factors are vital to ensure a total soccer performance is achieved. The success in improving all of these factors towards the highest quality need to be compliment with a critical training program from the start of the pre-season. The maximum performance of the players needs to be achieved before the season start and well maintained throughout the

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season. The variables manipulation of the periodization training plan can help to improvise and provide a better adaptation on the players. A variation and flexible training methods can familiarize the players with the compact and unexpected match schedule during the in-season phase (Wing, 2018).

To make sure soccer players able to adapt to the soccer demands in a competitive match, the element of speed and power need to progressively develop and train throughout the season. However, there is limited study has been conducted in the area of training method and strategy that can improve both of this element with neuromuscular ability and capacity related to the nature of soccer. The strength and conditioning coach needs to implement an effective training drill to maximize individual abilities (Loturco, Pereira, Kobal, & Nakamura, 2018).

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In preparing high profile professional soccer players, it has to be started from the youth and development level. The development of technical ability, tactical ability, psychological ability, and physiological ability is very crucial to make sure the effectiveness of the training program can be achieved. However, the player's performance monitoring also needs to be consistently assessed and monitored to make sure the progress of the players is positively on track. The success of this program needs to have a great integration between strength conditioning coach, sports scientist, and coaching team (Ryan, Lewin, Forsythe, & McCall, 2018).

Soccer training has been evolved from the past few decades. Methodology in fitness training also went through this transition and evolution process. The new approach in fitness training that can result in a greater performance has been found

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through intensive research conducted. The scientific evidence has been transferred into a practical session on the field and the outcome from the training is assessed. A lot of theories have been studied all over again to make sure it is consistent and updated with the nature of modern soccer. Even though some controversial arise among coaches regarding the best training method to be applied in the field, the excitement in practicing, evaluate, and coaching is still implemented. The player's ability and competency in demonstrate a holistic performance including a tactical ability also contribute towards maximal performance in a match (Clemente, Martins, & Mendes, 2014).

All of the relevant training drills need to be implemented either on the field or in a theoretical concept in the order it produced a maximum impact on the player's performance. Soccer players with high aerobic fitness could be better adapted to maximal exercise and have a better recovery at the end of an incremental test and between the different stages of a specific intervallic test (Nakamura et al., 2017).

Specialized and strategic abilities in soccer are profoundly subject to the player's physical capacity (Bangsbo, 1994; Hoff, 2002). More than 90% of a diversion is performed by high-impact metabolism and the normal force is around the anaerobic lactate edge (Bangsbo, 1994; Helgerud, 2001). However, the genuine time spent at precisely that power is around 20 minutes, as the players either practice above or underneath this threshold. One of the most vital elements that impact the practice force is the player's maximal oxygen uptake (Helgerud, 2001).

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Strength and conditioning training can be considered as a new approach and concept for players, parents, and coaches. Participation in strength and conditioning needs to be exposed and it takes some period to set up or build the education of the training in the daily culture of sports. Based on the scientific evidence fact, the compliance on the strength and conditioning training that was implemented effectively resulted in the improvement of physical conditioning performance and reduce the risk of injury. The transformation from the evidence-based data into practice on the field need to be particular and detailed calculated to ensure the training resulted in a positive impact (Wright & Laas, 2016).

To ensure the training program is successful throughout the season and able to sit in and fit every individual ability and needs, the player's performance needs to be monitored and the strategy has to be laid out from the overall outcome of the monitoring process. The pre-season calendar and in-season match calendar also need to look into to not suppress the element of recovery (Walker & Hawkins, 2018).

A short pre-season and cramp schedule of the match impaired the player's ability and fitness performance. A proper and optimized periodization needs to be prepared and implemented to make sure the players able to respond accordingly towards the training stimulus and physiological reaction reflect from the match day. The unique and suit into all angles and aspects of player's ability without overlooking the recovery pattern need to be prepared and it is a big challenge for the coaching team (Favero & White, 2018).

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To improve cardiovascular fitness, there are a few types of exercise that can be implemented to gain a beneficial result. One of them is fartlek training. Fartlek training means 'speed play' is a kind of training that has begun to be introduced in Sweden. Although it is similar to the practice of pause this exercise activity emphasizes the development of an athlete's speed. In this training activity, there are related to the acceleration, where the athlete is required to perform a sprint run or a certain rate which is usually determined based on the percentage of maximum capacity (Chaudhari, 2017; Kumar, 2015).

In fartlek training also have a two variation which is closed fartlek and open fartlek training. Closed fartlek activities are conducted in closed areas such as tracks at the stadium or on the football line. Such training has control and there is a predetermined running plan although it is free. It depends on time control or distance control. The coach must first define what activities to do in every corner or section of the track traveled or determine the running time of each activity. On the other hand, in open fartlek, the athletes are not bound by any specific controls. The run is determined by the athletes themselves according to their desires and abilities. It is performed in an outdoor area that provides the opportunity for athletes to interact and use the environment as an additional factor in their training such as hillside, and run, grass and field, coastal run, and others. The purpose of doing fartlek training such as increased cardiovascular fitness, build and improve speed, and improve speed-endurance maintenance (Mande Sudhakar Babu, 2014; Budiman, 2017; Mande, 2014).

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Another type of interesting training method that is reflected or similar to the nature of soccer is interval training. Interval Training is a method of physical exercise that involves repetitive work pressure and is accompanied by adequate rest periods. It is a training system introduced by Astrand and practiced by Paavo Nurmi in 1920. This practice is different from other physical exercises as there is a break between work breaks, while other training methods continue without rest between work repetitions. This exercise can increase the athlete's anaerobic capacity and is especially beneficial for building and improving aerobic energy systems and anaerobic systems (Olivier Rey, 2017). There is a benefit of practicing interval training. Interval training can increase anaerobic capacity, enhance cardiovascular cardiac arrest, improve agility, speed, tenderness, and coordination, improve athlete's skills, increase anaerobic threshold levels, improve muscular endurance, increase the maximum load for the energy system, stimulates blood vessel opening or capillary which is more efficient, increases the volume of hemoglobin that helps bring oxygen to the muscles in need, enhancing enzyme activity in metabolism of fatty acids (Gonzalez, 2016).

Circuit training is one of the most commonly used training methods for testing physical fitness. This training was introduced by Morgan and Adamson in 1953 at the University of Leeds, England. Circuit training is a training that involves certain stations and is done within the specified timeframe. One circuit has been performed if the perpetrator has done all the activities. This exercise is an exercise where participants perform several activities in series or a circuit. The amount of activity selected is between eight to twelve exercises and involves different muscles (Wall, Miller, & Hannon, 2011). Some of the benefits of the circuit training enhance muscle

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endurance, improves and trains anaerobic and aerobic properties, improves hardness, agility, and tenderness, and builds cardiovascular endurance (Simonson, 2010).

Plyometric words are derived from the Greek 'Pleythein' which means the rise or rise or the Greek root Plio and Metric 'which means many and many meanings. Today plyometric refers to the characteristics of the exercise of strong muscle-coaxing in acting on the speed, loads, or stretching of the muscles involved. Plyometric Exercise is a dynamic power system used to increase the muscle power involved in the movement similar to the trained event (Booth & Orr, 2016). The effect of plyometric training can increase the dynamic power of the muscles involved, improve anaerobic ability, enhance muscular hardness and specific muscle function and increase muscle speed and strength (McKinlay, 2018; Lum, 2016).

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Long slow distance training or LSD is one of the training methods that can be applied to the players. This long slow distance exercise is suitable for enhancing the aerobic energy system as it can stimulate the capillary opening and increase the myoglobin content that transports oxygen to the muscles and increases the enzyme activity involved in the metabolism of fatty acids. These physiological changes affect the respiratory cardio system and thereby enhance the aerobic energy system. Long slow distance also very suitable for athletes so it does not bother them. The recommended ideal distance for this running is 10km to 15km. Athletes are not required to race for victory during the run, but they are required to complete the run within the specified range (Turner, et al., 2013). In the result of long slow distance training, it benefited in to develop the aerobic system or the efficacy of the cardiorespiratory system, develop cardiovascular endurance and leg muscles, improve

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the ability to complete the run within a specified distance regardless of the winning factor, and enjoy the beauty of nature (Sperlich, 2015; Kris Beattie, 2014).

According to the United States Physical Education Academy (AAHPERD), physical fitness is the ability to perform day-to-day tasks without excessive fatigue and sufficient energy for recreational activities. Also, a physically fit person is prepared to face the emergencies of anxiety that may arise (Caspersen, 1985; Bouchard, 1994; Blair, 2001). Fitness according to motor performance can be divided into six parts and agility is one of the components in it. Agility is the skill and ability to start, stop, and change the movement and body position quickly and accurately without losing the balance of the body of a particular space. Agility is influenced by strength, speed, balance, the center of gravity, skill, and coordination (Sheppard, 2007; Jovanovic, Sporis, Omrcen, & Fiorentini, 2011).

The maximum oxygen consumption of an individual can reflect the ability, efficiency, and effectiveness of cardiovascular fitness. In addition, there are many kinds of training methods used to develop this cardiovascular function to achieve its maximal performance. The example of a training method that can be used such as long-slow distance training that requires the athlete to perform at a low and constant level of training intensity with a high duration of time (Wouter Hoogkamer, 2016). The other one is a speed play method that calls fartlek. It is a manipulation of speed throughout the training. The speed is also related to the intensity of training and of course, this kind of training creates the element of fun and enjoyment for the athlete because there is no systematic plan for this method. The speed or intensity of the training is depending upon the athlete's ability and condition at the time of the club's

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(Chaudhari, 2017). The athlete may be required to increase their speed or intensity if their heart rate level is low and vice versa. There is also the training method that simultaneously can improve cardiovascular fitness and the recovery process of the athlete because this method of training allows the athlete to have their resting time in between their exercise. There is a ratio of working and resting in the training program. Higher working intensity needs higher resting time for the athlete to recover, and vice versa (Jenna Gillen, 2016).

Also, there is a training method that can be used to develop many components of physical fitness in one training program. It is called circuit training. In circuit training, we can separate it into several stations, and the athlete needed to cover up all the stations one after another in time or repetition that required. The difference station provided the different training exercises targeted for the different muscle parts or physical fitness components. However, there is a question that arises from this type of training method (McMillan, Miller, Combs, Gibson, & Ard, 2018). The previous study showed a various training method has been used and all of it results in improvement on cardiovascular fitness. In the example, the study that has been done by (Nasis, 2009), the effectiveness of interval-load training and constant-load training towards the patient with COPD are equal and there is a major improvement in the BODE index score, 6-min walking distance and as well as the MMRC dyspnea scale. Besides that, there is also a study that proved that the VO_2peak, HR recovery, and the quality of life after coronary artery bypass grafting can be a significant increase in a 4-week intense rehabilitation program through aerobic interval training and moderate continuous training (Moholdt, 2009).

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The athlete or sedentary people need to improve their cardiovascular fitness to maximize the capacity of their work production. It means that the proper and effective training method should be selected to achieve that goal. There is no conclusive evidence that showed which training method gives a greater improvement in cardiovascular fitness. In the study that has been done by (Arnardottir, 2007) the COPD patients are clinically relevant easily being conducted in a group training for 3-min intervals training and it is proven that the 3-min intervals training is an efficient training mode for them which it can produce a result of improvement on W peak on average of 11weeks. Even though the interval training and continuous training were found to affect cardiovascular fitness, there is also various kind of training method that can do so.

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Improving cardiovascular fitness is one of the important parts of an individual life, whether for sedentary people or elite athletes. However, the reliable principle and application of training need to be used to get the beneficial and maximal effect of the training. The maximum aerobic conditioning of VO_2max increased with 3 times of exercises per week. On the other hand, to promote and maintain health, older adults need moderate-intensity aerobic physical activity for a minimum of 30 minutes on five days each week or vigorous-intensity aerobic activity for a minimum of 20 min on three days each week (Nelson, 2007). The same literature also stated that in 1995, the American College of Sports Medicine (ACSM) published a preventive recommendation that every US adult should accumulate 30 minutes or more of moderate-intensity physical activity on most, preferably all, days of the week (Deborah Riebe, 2015).

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The interval training is the combination and manipulation of intense physical activity period and the recovery period to allow expanding of training duration at the peak of performance level. He also stated that the recovery period is supposed to be 3 times longer than the interval training and the interval training duration needs to be increased one to five seconds beyond the usual best time (Joyce RamosLance Dalleck, 2015).

On the other hand, continuous training is the training that performed at 60% to 90% of VO_2max and in the duration of one hour or more. In the interval training, it utilizes glycogen in the muscles and triggers the anaerobic system in the body for the short bursts of activity. Besides that, during the recovery phase, the lactic acid was broken down. Furthermore, in aerobic continuous training, the physiological pathway kicked off the utilization of fat as a fuel because of the presence of the oxygen (Zoran Milanovic, 2015).

The cardiovascular fitness increased to double as before with 2 weeks of short burst training (Burgomaster, 2005). In the other study shows that the VO_2peak increased between baseline and 4 weeks of training in aerobic interval training 27.1 ± 4.5 vs 30.4 ± 5.5 ml·kg-1·min-1 and moderate continuous training 26.2 ± 5.2 vs 28.5 ± 5.6 ml·kg-1·min-1 (Moholdt, 2009).

This shows that cardiovascular fitness improved either with interval training or continuous training. But the significant differences in the greater improvement between both of these training methods still argue the researcher. Some of the studies supported that a higher intensity of training produced a greater performance for

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cardiovascular fitness. However, there were also supported studies that agree lower training intensity with a longer duration of training produced better improvement on cardiovascular fitness (Stuart Biddle, 2015; Costigan, 2015; Dan Fransson, 2018).

When the issues about which one from both of this training method can give a greater effect on VO_2max, the previous study that has been done need to be revised back. For example, the study that has been done by 10 weeks of the training program, interval load training, and constant load training show an increment in 6 minutes walking test and cycling Wpeak (Nasis, 2009). On the other hand, after 16 weeks of training with >80% for interval and >65% for continuous, the result of both group shows the increment in Wpeak and VO_2peak (Arnardottir, 2007).

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The study that has been done stated that in COPD patients, continuous and interval training gives a similar physiological effect. Again, there is no significant difference in both training methods (Varga, 2007). It is supported by the study that has been done in 1996 by Tabata, within six weeks of moderate-intensity endurance training inclusive of 70% of VO_2max, 60 minutes x five days a week, and 170% of VO2max high-intensity interval training with 7 – 8 sets of 20 seconds x 10 seconds recovery between bouts, both of the training resulted in significant improvement on VO_2max (Tabata, 1996).

In term of interval training method, there is a lot of study that has been done that prove the effectiveness of the training towards VO_2max. According to the study by (Talanian, 2007) eight women performed a VO_2peak test and a 60 min cycling trial at approximately 60% VO_2peak before and after training. Each session consists of ten

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4 minutes bouts at approximately 90% of VO_2peak with 2 minutes of rest between intervals. After 2 weeks of training, it shows, VO_2peak increased by 13%. In the other study, 8 weeks of the training program in a cross over design, separated by 12 weeks of detraining, showed an improvement of 9% in continuous training and 15% in interval training (Daussin, 2007).

In 2005, the study found there were no significant changes in VO_2peak after 2 weeks of sprint interval training. The subject performed six sessions of sprint interval training (SIT) about 2 weeks with 1-2 days rest between to promote recovery. The training sessions consist of four to seven all-out 30 second Wingate tests with 4 minutes of recovery (Burgomaster, 2005). However, the study by Barclay, in 5-month of walking training at more than 70% of maximal intensity, it resulted in greater improvement of VO_2peak (Laurie Barclay, 2007). In 2008, Perry found that high-intensity interval training increase VO_2peak by 9%. It is the result of 6 weeks of training. The training consists of 1 hour of 10 x 4 minutes interval at 90% of VO_2peak, separated by 2 minutes rest. It's conducted 3 days a week (Perry, 2008).

The improvement in cardiovascular fitness also has been shown in patients with stable-severe chronic heart failure, a three-week interval training program increases the peak oxygen consumption by 20%. Furthermore, within 8 weeks with three days a week of training, high-intensity aerobic interval training resulted in significantly increased VO_2max compared with long slow distance and lactate-threshold training intensities (Helgerud, 2007). On the other hand, the regular high-intensity intermittent exercise is shown to significantly increase in aerobic and anaerobic fitness (Boutcher, 2011).

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Warburton found that interval training can improve cardiovascular fitness effectively. The result shows, there was a significant improvement in resting and maximal exercise oxygen pulse, VO_2peak, Bruce treadmill time, and time to exhaustion (Warburton, 2005). However, the recent study showed that the patients with CAD who undergo the interval training improves 10% greater in VO_2peak than lower intensity training. In the other study shows that the high-intensity interval walking training had an increase in a peak aerobic capacity, the training was consist of 5 or more daily sets of 2 to 3 minutes low intensity walking intervals which is at 40% of maximal oxygen capacity followed by a 3-minute interval of high intensity walking between 70% and 85% of peak oxygen capacity for at least 4 days per week (Laurie Barclay, 2007).

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There was also the study that has been done showed only minimal improvement on cardiovascular fitness, such as the study that has been done before, 7 weeks of the training program which began at an intensity of 85% VO_2max and increases 5% every two weeks to 90% and 95% of VO_2max. The result shows significantly by 5% and 6% of improvement (Jeff Burke, 1994). On the other hand, the moderate continuous training and aerobic interval training that has been conducted for 12 weeks shows that the VO_2peak increased more with aerobic interval training than moderate continuous training which is 46% versus 14%. It seems to be different in a study that has been conducted by Jochen Kluve, in 10 to 395 days of the various continuous training program, it showed the cardiovascular fitness level had increased within the 100 days and then being stagnant throughout the treatment. It was also showed that longer training programs do not add treatment effects (Jochen Kluve, 2011).

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Group activity recreations, for example, soccer and hockey expect members to play out various short runs, scattered with times of rest or low-to direct power movement. Huge numbers of these dashes are isolated by rest periods sufficiently long to permit finish or close total recuperation and in this way ensuing run execution isn't altogether disabled. In any case, on-going diversion investigation has demonstrated that a portion of these runs are isolated by short rest periods which have been appeared to adversely influence ensuing dash execution (Edge, Bishop, Goodman, & Dawson, 2005; Balsom, 1992)

In this way, one of the wellness necessities of group activity competitors is the capacity to perform brief length dashes in less than ten seconds with a short recuperation time which is under thirty seconds. This wellness prerequisite has been named rehashed run capacity. In any case, the impacts of various preparing strategies on repeated sprint ability are hazy. Run preparing thinks about have revealed changes in longer rehashed dash execution (Gaiga, 1995; Green, 1999; McKenna, 1993).

Nevertheless, few reports have examined the impacts of preparing on short repeated sprint ability, like that experienced in group activities. To date, thinks about that have explored preparing adjustments to rehashed short dashes which less than ten seconds have all utilized short, rehashed runs as the preparation jolt. While preparing that is particular to the errand, that is, short dashes might be the most useful preparing methodology to enhance repeated sprint ability, preparing techniques that enhance different wellness qualities, for example, continuance limit, may likewise influence repeated sprint ability (Jenkins, 1994; Ortenblad, 2000).

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Focused soccer is an intermittent, high-power physical movement that requires all-around created oxygen-consuming and anaerobic wellness (Ekblom, 1986; Reilly, 1997; Reilly, 2003; Reilly, 2000). The pertinence of vigorous wellness in soccer has been affirmed by distinct, cross-sectional, what's more, preparing contemplates. Moreover, as soccer execution is portrayed by a few activities, for example, dashing, bouncing alters in course, and handling, solid quality, and power has additionally been appeared to be vital attributes for soccer players (Gaskill, 2001; Smaros, 1980; Wisloff, 1998).

The physiological strain related to the research center based soccer-particular discontinuous convention was like that related to 45 minutes of soccer coordinate play, in light of the factors estimated, showing the importance of the reproduction as a model of match-play work rates. Soccer-particular irregular exercise did not build the requests put on the oxygen-consuming vitality frameworks contrasted with constant exercise performed at a similar normal speed, even though the outcomes show that anaerobic vitality arrangement is more vital during intermittent than during persistent exercise at a similar normal speed (Drust, 2000).

Enhanced oxygen take-up enhances soccer execution as respects remove secured, associations with the ball, and several dashes. Huge upgrades in oxygen take-up have been demonstrated utilizing interim running. A comparable physiological load emerging from interim running could be acquired utilizing the soccer ball in training. Performing high force 4 minutes interims spilling soccer ball around an extraordinarily planned track together with standard soccer preparing is powerful to

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improve the VO_2max of soccer players, with no negative impedance impacts on quality, bouncing capacity, and run performance (McMillan, 2005).

An abnormal state of quality is innate in tip-top soccer play, yet the connection between maximal quality and dash and hopping execution has not been examined completely. Maximal quality into equal parts squats decides to run execution and hopping tallness in abnormal state soccer players. High squat quality did not suggest diminished maximal oxygen utilization. First-class soccer players should center on maximal quality preparing, with an accentuation on maximal activation of concentric developments, which may progress their run and bouncing performance (Wisloff, 2004).

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The high-impact limit of soccer players significantly impacts their specialized execution and strategic decisions. In this manner, the appraisal of a soccer player's high-impact execution ought to be of enthusiasm for soccer coaches to assess and enhance their intense exercise sessions. The present examination exhibited a critical connection between research center testing of VO_2max and execution in the Hoff test. Moreover, preparing instigated enhancements in VO_2max was reflected in enhanced execution in the Hoff test. It is recommended that it ought to be an objective for dynamic U-15 soccer players to cover more than 2100 meters in the Hoff test, as this requires a VO_2max of over 200 ml/kg/min, which should fill in as a base in present-day soccer (Chamari, 2005).

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Soccer is the most prevalent game on the planet and is performed by people, youngsters, and grown-ups with various levels of mastery. Soccer execution relies on a bunch of variables, for example, specialized/biomechanical, strategic, mental, and physiological regions. One reason that soccer is so well known worldwide is that players may not require including an uncommon limit inside any of these execution zones, yet having a sensible level inside all regions. Be that as it may, there are patterns towards more precise preparation and determination affecting the anthropometric profiles of players who contend at the most elevated amount. Similarly, as with different exercises, soccer isn't a science, however, science may help enhance execution. Endeavors to enhance soccer execution frequently center on strategy what's more, strategies to the detriment of physical fitness. During an hour and a half match, world-class level players keep running around 10 km at a normal force near the anaerobic edge, 80-90% of maximal heart rate. Inside this perseverance setting, various dangerous blasts of movement are required, including hopping, kicking, handling, turning, dashing, evolving pace, and managing compelling withdrawals to keep up adjust and control of the ball against protective weight. The best groups keep on increasing their physical limits, while the less very much positioned have comparative qualities as detailed 30 years back. Regardless of whether this is an outcome of fewer evaluations and preparing assets, offering the best players, or potentially learning of step by step instructions to perform compelling activity preparing regimens in less very much positioned groups, isn't known. As there do exist groups from bringing down divisions with a high oxygen-consuming limit as proficient groups, the last factor most likely assumes an essential part (Stolen, 2005).

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In proficient soccer, a lot of preparation time is used to enhance players' high-impact limit. Notwithstanding, it isn't known whether soccer particular preparing satisfies the basis of successful intense exercise to enhance maximal oxygen take-up. Soccer particular exercise utilizing ball spilling or little gathering play might be executed as oxygen-consuming interim preparing. Heart rate checking during soccer-particular exercise is a substantial marker of genuine exercise force (Hoff, 2002).

2.4 Importance of Speed and Speed Endurance in Soccer

Physical fitness demand in modern soccer is moving towards higher intensity and requires players to do more high speed running, sprinting, accelerate, decelerate, and change of direction or turning. The fast tempo of the game force the players to tolerate the sprinting, quick transition from attacking to defending or vice versa, the ability to put high pressure on the opponent, ball-winning ability, and scoring. Sprinting activities contribute 12% of total distance covered and it is short in distance and time which is 16 meters in the mean distance and 2 seconds in the meantime. Most of the sprinting in a match is produced in a short distance and short in time. In a study conducted also showed cardiovascular fitness performance can be improved with a high volume of training and high intensity in training load (Gil-Rey et al., 2015).

The changes in tactical play and team formation in modern soccer contribute to high physical demands. In English Super League, comparison between the 2006/2007 season and 2012/2013 season, wide positions players show a greater increment in high-intensity running (Bush, Barnes, Archer, Hogg, & Bradley, 2015).

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The size of the pitch also represents the distance of sprinting covered in a match besides the position played by the players. Most of the outfield or wide position player covered more on a total number of sprints and total sprint distance covered.

Analysis in European Champions League and UEFA cup competition showed that sprinting characteristic is influenced by the position of the player and wide midfielder have to complete additional high intensities activities during a training session to achieve the performance level required in the match (Di Salvo et al., 2010). Before a goal, straight-line sprinting is the most frequent action that happens either to scoring or assisting other players to score, and in time-motion analysis, it shows a short sprint occurs frequently in a soccer game (Haugen, Tønnessen, Hisdal, & Seiler, 2014). Although HRR has been used to assess recovery after single bouts of exercise, findings of the previous study showed that HRR has been less frequently used to assess recovery during intermittent and progressive efforts. The training load applied to the players within a week of training program needs to be well monitored and the physiological response of the players needs to be taken into consideration in planning their recovery program (Haugen, Tønnessen, Hisdal, & Seiler, 2014).

Soccer is considered as intermittent team sports. The importance of explosive power, strength, and plyometric force for a different kind of activity in a different kind of training drill was studied before and properly documented. All of these factors or indicator needs to be looked up and study before preparing a training program to reduce the risk of injuries and elevate a high level of fitness performance. Most of the time in a match, the players have the moment to recover. The major activity performed in a soccer match reflects the moment for the player to recover which is

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completed low in intensity such as walking and jogging (Di Salvo et al., 2010). Therefore, it is shown that soccer is an intermittent nature of sports, and the training drills, fitness testing, and performance evaluation need to be done according to that nature. In a soccer match, again, soccer players need to have a flexible ability to moving with a flow of the opponent and keep up with the pace of a team play, this quick response and reaction also need them to be well prepared.

The ability to generate a specific amount of force and ability to move quickly and change in direction and ability to sustain in a whole match period, demands players to be well prepared and positive in absorbing a training stimulus given. Traditionally, 12 minutes Cooper running test or shuttle run test has been applied in soccer, but the type of exercise is different from what is experienced in a soccer match, hence it's leading towards the development of the yoyo intermittent test (Bangsbo, 2016). It is irrelevant to test the player with continuous or aerobic endurance cardiovascular test only because it is cannot reflect the actual ability of the players as in the match demanding the players to do several actions at a different level of intensity and working duration. To fulfill these criteria, different kinds of fitness programs that specific and relevant towards match demands need to be implemented to improve their physical fitness in terms of aerobic and anaerobic power.

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The activities of the players in a match are unpredictable, changes in intensity, changes in direction, and mode of movement. Repetitive sprinting ability and high in cardiovascular fitness ability are the most requirements in soccer nature, hence to develop all these factors need to start from the pre-season phase throughout the end of the season (Meckel et al., 2018). In the course of a match, the players cover 8 to 13km

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and the distance is covered with an intermittent exercise pattern (Di Salvo et al., 2010). To ensure the training drill exercise is representing the actual match situation, a proper fitness testing variable also needs to be considered. The reliability of fitness training and testing is very important to measure optimum player performance.

Based on the nature of the soccer match, the eccentric training, especially on the hamstring, has attracted a lot of studies or research interest. A soccer player's performance is influenced by physiological characteristics possessed by the player, such as high velocity running ability at lactate threshold level and maximal oxygen uptake level. This physiological characteristic of players has been accepted varied based on the position of play of each player (Di Salvo et al., 2010).

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On the other hand, the majority of the practices carried out by soccer players include specific soccer training strategies that were designed by coaches to improve soccer players' technical–tactical competence (Gil-Rey et al., 2015). Soccer is a team sport that played in two half of a period. This period demanding a soccer player to possess an ability to recover in the shortest time and high in aerobic and anaerobic capacity including the high ability in technical and tactical skills. All of these abilities, again, need to be acquired and maintain throughout the season (Meckel et al., 2018).

Aerobic fitness is essential for soccer athletes to perform at an optimal level. In addition to aerobic fitness, repeated sprint performance is also a critical component of game performance in soccer. The previous study has shown that approximately about 12% of sprint-based work performed by a soccer player at a competitive level matches, with the short sprints are an average of 16m per sprint (Di Salvo et al.,

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2010). The relationship between the aerobic and anaerobic variables on an athlete's ability to reproduce sprints is debatable and the current research is conflicting due to the varying forms of a repeated sprint test as for training and testing, the distance of 20m up to 40m were typically used (Nikolaidis et al., 2016). The ability to change in sprint direction is highly related to the demand in sprinting tasks. To better assess the sprint ability of soccer athletes, a running sprint test should be utilized with shorter sprint distances than 40 meters (Sanders et al., 2017). It is reasonable to suggest that soccer athletes frequently engage in sprint distances of less than 40 meters and it is imperative to assess if aerobic fitness is still related to soccer athletes sprint ability when shorter sprint distances are being utilized. Thus, it appears that while interval training may be superior at minimizing the decrement during repeated sprints, intermittent or repeated-sprint training is superior at improving the performance of individual sprints. While different training strategies can be used to improve each of the potential limiting factors in sprint ability, the concurrent implementation of different forms of training may be the best strategy to improve sprint ability among soccer players.

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Match investigation has confirmed that during intensive soccer, players play out a lot of action including turning and changes of bearings over an assortment of forces (Withers, 1982). As of late, single-carry dash execution was observed to be unequivocally identified with maximal squat execution and vertical hop in world-class soccer players with high VO_2max esteems (Wisloff, 2004). Moreover, considers that gave quality preparing to tip top-level soccer players have demonstrated that enhancements in maximal and dangerous quality parallel running-economy improvements. From these outcomes, it could be speculated that bring down

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appendage hazardous quality may decidedly influence execution in dynamic, multistage, high-power field tests, for example, YYETL2 and YYIRTLl, which include broad, constant and irregular, carry running, individually (Hoff, 2004). The connections between continuous shuttle run tests or intermittent shuttle run tests and physiological appraisals of vigorous wellness factors, for example, VO_2max has been now announced (Krustup, 2003).

Be that as it may, as far as anyone is concerned, no investigation has analyzed the connections amongst YYETL2 and YYIRTLl, and between those field tests and conventional physiological parameters of oxygen-consuming wellness surveyed in the research center, on a similar gathering of soccer players (Kriska, 1984; Williford, 1999). High force, oxygen-consuming, perseverance, interim preparation can be completed in a more soccer particular path than plain running. An exceptionally planned spilling track and little gathering play can create the expected work power. Heart rate is appeared to be a substantial and dependable marker of oxygen take-up in little gathering play with no, or just short, stops, and also on the spilling track, has appeared in this experiment (Hoff, 2002).

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High-impact perseverance execution is subject to three critical components, maximal oxygen uptake, anaerobic threshold limit, and work economy. VO_2max is characterized as the most astounding oxygen uptake that can be accomplished during dynamic exercise with expansive muscle groups (Pate, 1984; Wagner, 1996). Previous examinations have demonstrated a huge connection among VO_2max and separation secured within a match and a rank request relationship among VO_2max and arrangement in the class of the best groups in Hungary has been shown (Bangsbo,

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1994; Smaros, 1980). These discoveries are upheld by Wisloff et al, who have demonstrated a significant distinction in VO_2max in individuals from the best group contrasted and those in the least set group in the Norwegian world-class association (Wisloff, 1998).

As of late, enhance of the study conducted before, demonstrated that interim preparing 90– 95% of maximal heart rate running tough for four times of four minutes, isolated by three minutes dynamic rest at 70% of maximal heart rate, two times every week more than nine weeks, expanded maximal oxygen take-up by 11% (Helgerud, 2001). This brought about a 20% expansion in separate secured in a match, a 23% increment in contribution with the ball, and a 100% expansion in the number of runs, featuring the upsides of a high VO_2max in soccer.

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The anaerobic limit is characterized as the most noteworthy exercise power, heart rate, or oxygen uptake, working progressively with extensive muscle gatherings, in which the creation and leeway of lactate are about the same (Helgerud, 1990). Anaerobic edge in outright terms (ml·kg-1·min-1) is essential, however, it is very reliant on VO_2max, and does not appear to change much in the level of VO_2max. Attributable to the length of a soccer match, the normal exercise force can't be considerably higher than that relating to the anaerobic limit. Notwithstanding, players don't practice for significant lots of the amusement at the anaerobic edge, yet either over the edge or underneath the edge (Helgerud, 2001).

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Running is generally not the most loved action of soccer players. Be that as it may, playing soccer isn't accepted to give adequate exercise force after some time to enhance VO_2max exceptionally much (Helgerud, 2001; Wisloff, 1998). During interim preparing, as detailed by (Helgerud, 2001) power is typically observed and controlled by hearing rate screens. During a session of soccer, apart, focusing on supportive people and opponents and controlling the ball or tension caused via preparing or coordinate circumstances, may prompt heart rates above what reflects the genuine workload. To accomplish legitimate exercise powers in soccer particularly preparing, the connection between heart rate and oxygen take-up must be built up (Blix, 1974; Herd, 1991).

The VO_2max is viewed as the record that better portrays the relationship between the greatest oxygen-consuming force and development economy since people with comparable VO_2max esteems can display diverse VO_2max esteems, that is, distinctive vigorous exhibitions, in light of contrasts in development economics. Nonetheless, it is hard to contrast our esteem and those announced in past investigations, generally utilizing perseverance competitors, in light of the different conventions that have been utilized (Billlat, 1994).

Soccer is viewed as a mind-boggling sport since execution relies upon an abnormal state of strategy, strategic capacity, and physical conditioning. Physical conditioning can be considered to incorporate the anatomical, useful, biomechanical, and physiological adjustments to preparing (Impellizzeri, 2005). Despite the significance of procedure and strategies, physiological adjustments are regularly stressed via mentors because these adjustments have been related to enhanced soccer

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execution (Helgerud, 2001). In any case, to all the more likely plan wellness preparing programs, it is essential to comprehend which physiological characteristics best connect with soccer-related execution (Da Silva, Guglielmo, & Bishop, 2010).

Late examinations have featured vigorous power, the speed at the beginning of blood-lactate aggregation, and repeated sprint ability as vital physical wellness parts for soccer players (Helgerud, 2001; Impellizzeri, 2005; Spencer, 2005).

The connection between oxygen-consuming wellness and RSA along with these lines changes relying on the investigation. In any case, most investigations have just utilized VO_2max as the significant pointer of oxygen-consuming wellness. This may not be the most proper list because VO_2max is accepted to be resolved basically by focal components, while RSA has been all the more emphatically connected with fringe factors (Da Silva, Guglielmo, & Bishop, 2010; Basset, 2000; Spencer, 2005)

The high force running with and without ball ownership is decreased in different periods of first-class standard soccer matches and the movement profiles and exhaustion designs shift among playing positions. The present discoveries give important data about the high force running examples of an expansive example of world-class standard soccer players, which could be helpful in the improvement and remedy of particular preparing administrations (Bradley, 2009).

In a match, LMF/RMF covered a more prominent separation in high force running than CMF, LB/RB, ST, and CB. In the last 15minutes of playing time, high force running separation was reduce by 20% not exactly in the initial 15-min period

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for LMF/RMF, CMF, LB/RB, ST, and CB. There was a comparable separation shortfall for high force running with and without ball ownership between the last 15minutes and the initial 15minutes time of the diversion. The decrease in high force pursuing instantly the most serious 5minutes period was more apparent in ST and CB (Bradley, 2009).

In general ball, possession did not contrast between 4-4-2, 4-3-3, and 4-5-1 formation. No distinctions were seen in high power running between 4-4-2, 4-3-3, and 4-5-1 developments. Contrasted and 4-4-2 and 4-3-3 developments, players in a 4-5-1 formation performed less high-power running when their group was under ball possession and key however more when their group was not under ball possession (Paul Bradley, 2011).

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Striker is a 4-3-3 performed 30% more high-power running than a striker in 4-4-2 and 4-5-1 developments. In any case, the part of fruitful passes was most elevated in a 4-4-2 contrasted and 4-3-3 and 4-5-1 developments. It is recommended that playing development does not impact the general action profiles of players, aside from striker, yet impacts on high-power running action with and without ball possession and some specialized components of execution (Paul Bradley, 2011).

There are real individual contrasts in the physical requests of players in a diversion identified with physical limit and strategic part in the group. These distinctions ought to be considered when arranging the preparation and nutritious procedures of best class players, who require noteworthy vitality consumption in seven days. In soccer, the players perform discontinuous work. Despite the players

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performing low-power exercises for over 70% of the diversion, heart rate and body temperature estimations recommend that the normal oxygen consumption for professional soccer players is around 70% of the most extreme. This might be incompletely clarified by the 150-250 brief extraordinary activities the best class player performs during a match, which additionally demonstrates that the rates of creatine phosphate usage and glycolysis are much of the time high in a diversion (Bangsbo, 2006).

From a physiological perspective, repeated sprint ability is a perplexing quality accepted to be identified with both neuromuscular related and metabolic-related elements. It is natural, in this manner, those preparation techniques focusing on the advancement of maximal dash speed, metabolic capacity, or both at the same time, may represent a change in rehashed run ability. (Glaister, 2005; Spencer, 2005). To date, most examinations in youthful group activity players have explored the impact of either a metabolic situated "blended" program. Results have been empowering because the total of what strategies have been appeared to enhance repeated sprint ability altogether from 1.5% to 3% (Bravo, 2008; Buchheit, 2008).

Touchy compose quality training is normally used to enhance neuromuscular characteristics for athletic execution in the two grown-ups and youthful competitors (Gorostiaga, 2004; Harris, 2007; Mikkola, 2007). For instance, following two months of unstable strength preparing in the previous study, it was found that changes in 30m dash times in youthful long-remove sprinters. Awesome upgrades in bouncing capacity have likewise been seen in youthful soccer players while adding hazardous

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quality exercise to a typical soccer instructional course (Mikkola, 2007; Buchheit, Mendez-Villanueva, Delhomel, Brughelli, & Ahmaidi, 2010).

Maximal oxygen consumption was not connected with the quickest 40m run time however was tolerably associated with add up to run time. Since the mutual change between maximal oxygen uptake and add up to dash time was just 12%, enhancing high impact wellness further may be required to contribute insignificantly to enhancing repeated sprint execution of the group amusement players. It stays conceivable that an abnormal state of oxygen-consuming wellness upgrades different parts of match play in diversions like soccer and hockey (Aziz, 2000).

Regardless of indistinguishable aggregate work, distinctive repeated sprint ability test conventions speak to various physiological difficulties. The vigorous framework assumes a noteworthy part in the upkeep of power level in a soccer match, which is described by short blasts of exercises. Anaerobic execution of rehashed brief endeavors forces unexpected physiological worry in comparison to a solitary delayed movement and, along these lines, may reflect distinctive physiological capacities. In this manner, anaerobic testing systems should comprise of particular conventions that copy the competitor's particular games movement design (Meckel, 2009).

The direct relationship between the deliberate VO_2max and 20m multistage shuttle run proposes that the two tests were conceivably estimating distinctive parts of a player's oxygen-consuming wellness. The absence of a relationship between estimated VO_2max and vigorous perseverance execution in the 20m multistage shuttle run with execution in the repeated sprint ability recommends that high-impact

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wellness essentially is ineffectively connected with execution in the repeated sprint ability in tip-top youth soccer players (Aziz, 2007).

In an investigation to look at the impacts of high-force small-sided games preparing versus repeated sprint ability preparing on rehashed run capacity, soccer-particular perseverance execution, and short passing capacity among junior soccer players, the outcome demonstrates that small-sided games preparing can be utilized as a viable preparing mode to improve both repeated sprint ability and short-passing capacity (Eniseler, 2017).

Soccer competitors must have the capacity to repeated sprint ability without huge declines in speed and quality and coaches need to more readily comprehend if oxygen-consuming wellness is identified with repeated sprint ability. All the more vigorously fit Division I soccer competitors were speedier at unsurpassed focuses during the repeated sprint ability test. Oxygen consuming wellness is related to quicker run circumstances in a more anaerobic repeated sprint ability test when run separations are under 40meters (Sanders, 2017).

Soccer is a standout amongst the most broadly played and complex sports on the planet, where players require specialized, strategic, and physical aptitudes to succeed. An expert soccer player ought to in a perfect world can keep up an abnormal state of power all through the entire diversion. A few investigations, be that as it may, have demonstrated a lessening in remove secured, a lower partial workforce, lessened glucose levels, and decreased lactate levels in the second 50% of amusements contrasted and the primary half (Helgerud, 2001; Douglas, 1993).

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In a perfect world, intense exercise for soccer players ought to be completed utilizing the ball. The players may then furthermore create specialized and strategic aptitudes like circumstances experienced during the amusement. Player inspiration is too ordinarily thought to be higher when the ball is utilized. Be that as it may, the work power regularly is lessened when more specialized and strategic components are included. It was demonstrated that playing four against four on a field a large portion of the size of a customary soccer field requires a higher workforce than when the field estimate is diminished to 33% of a general soccer field. If the objective is to prepare at a force zone somewhere in the range of 90 and 95% of THR, this is hard to sort out in a match circumstance, particularly for groups in bringing down divisions. Heart rate checking frameworks and a preparation regimen, where the force is moderately effortlessly managed, is most likely fundamental to expect comparable improvements as in this examination (Bangsbo et al., 2008; Helgerud, 2001; Bangbo, 1991).

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World-class soccer players invest a significant measure of energy endeavoring to enhance physical limits, including vigorous continuance and quality and the quality subordinates of speed and power. The normal oxygen consumption for worldwide soccer groups ranges from 55 to 68 ml·kg-1·min-1 and the half-squat maximal quality from 120 to 180 kg. These qualities are like those found in other group activities. As of late, it has been demonstrated that the heart's stroke volume is the component in the oxygen chain that essentially confines high-impact perseverance for competitors. These discoveries have offered to ascend to more concentrate preparing intercessions to anchor high stroke volumes, which, thus, have demonstrated positive in changing both maximal oxygen utilization and soccer execution regarding separation secured, contacts with the ball, and the number of runs in a diversion (Hoff, 2007).

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A soccer-particular oxygen-consuming preparation performed utilizing small-sided game was as compelling as interim running in upgrading high-impact wellness in junior soccer players. Specifically, these two high-impact preparation modes delivered changes in both aerobic power and aerobic capacity after the pre-season preparation period. Extra high-impact preparation in the focused season just brought about a direct however critical increment in running speed. The significance of oxygen-consuming preparing in soccer has been as of late affirmed by Helgerud who prepared a gathering of junior soccer players two times every week for two months toward the start of the aggressive season, utilizing a 4 × 4 minutes running interim preparing led at 90 – 95% of maximal heart rate (Helgerud, 2001). Resting periods between sessions were 3 minutes of dynamic recuperation. After this preparation mediation VO_2max, lactate limit, and running economy at lactate limit enhanced by 11, 16, and 7%, individually. Likewise, the separation secured in a match expanded by 20%, and the normal exercise force in matches expanded by 5%. Moreover, the number of runs multiplied, and associations with the ball in a match expanded by 23% (Helgerud, 2001; Impellizzeri, 2005).

Although Helgerud et al. showed the viability of running interim preparing, different creators have proposed sport-specific works out, for example, small-sided games, as an option method of high-impact preparing (Helgerud, 2001; Balsom, 1999; Bangsbo, 1994; Bangsbo, 1998; Bangsbo, 2003; Drust, 2000). Utilizing this preparation mode is conceivable to achieve practice powers inside the range that appeared by Helgerud et al. to be viable for enhancing oxygen-consuming wellness and soccer execution. Moreover, small-sided games based preparation ought to guarantee the initiation of muscle bunches as they are locked in during genuine

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coordinate play (Balsom, 1999; Bangsbo, 1994; Bangsbo, 1998; Bangsbo, 2003; Hoff, 2002).

Furthermore, as specialized and strategic aptitudes are included and prepared in conditions like genuine coordinate play, this game particular preparing ought to advance a viable exchange to the focused condition. Thus, the incorporation of small-sided games as a major aspect of soccer preparation is very basic in soccer clubs at all levels (Reilly, 2003; Krustup, 2003).

Regardless of the developing enthusiasm of coaches and game researchers in soccer-particular oxygen-consuming preparation, no trial proof of its viability has been accounted for. Consequently, the point of this investigation was to look at the impacts of small-sided games and running interim preparing regimens on vigorous wellness and match execution in soccer players, with specific regard for the control of the vigorous preparing jolt (Impellizzeri, 2005).

During an hour and a half match time, world-class level players keep running around 10 km at a normal force near the anaerobic edge, 80-90% of maximal heart rate. Inside this perseverance setting, various dangerous blasts of movement are required, including hopping, kicking, handling, turning, dashing, evolving pace, and managing compelling withdrawals to keep up adjust and control of the ball against protective weight. The best groups keep on increasing their physical limits, while the less very much positioned have comparative qualities as detailed 30 years back. Regardless of whether this is an outcome of fewer evaluations and preparing assets, offering the best players, or potentially learning of step by step instructions to perform

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compelling activity preparing regimens in less very much positioned groups, isn't known. As there do exist groups from bringing down divisions with a high oxygen-consuming limit as proficient groups, the last factor most likely assumes an essential part (Stolen, 2005).

Speed is viewed as a vital quality for the cutting edge session of soccer. The ways that 80% of the objectives scored in a match are gone before by a run are demonstrative of this (Faude, 2012). Likewise, much consideration is given to building up this quality in preparing. However, despite its assumed importance inside a match, it appears might be not able to segregate between those adolescent players that advance to the senior group and those that don't. All things considered, speed testing is a typical component in a test battery, normally including a 30 to 40m run with split interims and the quickest run being recorded for measures of increasing speed and most extreme run speed. While the shorter separations are normal in a match, coaches once in a while question the relevance of testing longer separations, the claim being that these separations are infrequently performed. However, it has been demonstrated that young soccer players do utilize a high level of their most during genuine match play (Darren Paul, 2015).

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2.5 sRPE as Performance Monitoring Program and Tools

Recently, most of the professional soccer team utilized the importance of performance monitoring systems or tools for their team. A lot of monitoring method evolves as the demanding in this area is highlighted. It is involved from the manual use of tools

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towards the higher sophisticated technology tools. From a good plan monitoring system, various outcomes can be obtained and analyzed. The performance monitoring program also can be divided into two phases which are an acute or immediate outcome and chronic or long term outcome. An example of acute or immediate performance monitoring systems such as RPE, sRPE, and GPS monitoring and the example of chronic or long term outcomes is fitness testing, heart rate recovery monitoring, and weekly total training load.

The session's rate of perceived exertion (sRPE) method is applicable in numerous exercises and sports. It is used to determine the training load in one session of training. In a study conducted for Australian Football, the sRPE has construct validity to quantify the training load in high intensity and intermittent team sports (Scott, Black, Quinn, & Coutts, 2013). It is also a valid and reliable method to be used for quantifying resistance exercise intensity (Egan, 2003). The sRPE method also can be considered as a better indicator to determine the training load internally from the players as it is also measured in terms of physiology and psychologically (Rodríguez-Marroyo & Antoñan, 2015). In an intermittent team sports event including soccer, the importance of sprinting ability is hardly express as one of the keys or the main factor contributing to fitness performance (Dardouri et al., 2014).

On the other hand, the external load measurement on high-speed running distance and the number of impacts and acceleration provide a moderate predictive in the sRPE method used in soccer training load monitoring (Gaudino et al., 2015). Sprint ability is a complex physical trait that is related to neuromuscular and metabolic factors. Both of the indicators, internal and external, can be used as a safe

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and valid indicator to monitor training responses in soccer (Casamichana, Castellano, Calleja-Gonzalez, San Román, & Castagna, 2013).

Since the environment and nature in soccer player's lifestyle and training are demanding them to adapt and flexible in changes of training intensity, playing hours, risk of injuries, changes in playing role or position of play, food or nutrition intake, the performance monitoring or assessment throughout a season need to be taking care seriously and all of this information assist a coaching staff team to overlook on the training program of the (Meckel, Doron, & Eliakim, 2018). By monitoring a training load on the players, the outcome for current physical fitness performance, level of fatigue, rate of recovery, and progressive intensity loading can be measured. In a figure of top soccer players, it is a must for them to living within a capacity of high fitness performance (Hoff & Helgerud, 2004). In terms of player position play in a team, there was no difference in lower limb strength found in dominant and non-dominant leg and therefore it does not affect the position that they play (Ruas, Minozzo, Pinto, Brown, & Pinto, 2015).

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Besides the tactical and technical outcomes, performance monitoring normally involves measuring the training load prescribed and physical performance outcomes from the players. In every training drill or session perform by the coaches, the principle of intensity, duration, frequency, and type of exercise is closely prioritize and calculate to ensure the objective of the training is achieved and the only way to reconfirm on that is by monitoring the training load itself and a series of fitness testing. A relevant progressive loading on the training intensity and volume including a sufficient recovery time resulted in super-compensation, but it will only be achieved

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if the training load is properly monitored and managed. Simple monitoring of player's training load, a practical manipulation can be made to increase the efficiency of the training session and provide a better result (Swinton, Munro, Dolan, & Burgess, 2016).

Based on the recent study also, it is proven beside of the technical, tactical ability and cardiovascular fitness performance, strength, and power training also contribute to the soccer player's performance (Bourgeois, Gamble, Gill, & McGuigan, 2017). The outcome for the interval capacity test is reflected from the duration of training and gameplay in a week before the test (Brink et al., 2014). It is shown that the result is related to the training load of that week and the importance of proper monitoring for that training load needs to be considered also. According to (Brink et al., 2014) also, they are using the session rating of perceived exertion (sRPE) and total quality rest (TQR) as their monitoring tool.

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There is also a study that using a heart rate as their performance monitoring tool, whereas the heart rate monitoring during recovery (HRR) is somehow associated with the changes in repeated sprint performance (Buchheit, Simpson, Al Haddad, Bourdon, & Mendez-Villanueva, 2012). Duration and recovery mode is found to be the key determinant factors sprint ability performance and can affect the kinetics of 'metabolic' restoration between successive sprints. The athlete's ability to recover can also be assessed through the heart rate recovery (HRR) which is defined as the rate at which the heart rate (HR) decreases. Based on the nature of the sports or specifically in a soccer match, all of the players are demanding in performing a short sprinting routine, jumping and challenge the ball in the air, quick change of direction, strength,

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and power to take a shot, and ball shielding, therefore every angle of fitness performance need to improve and well monitored from the beginning towards the end of the league.

In sports like soccer, heart rate or HR is, for the most part, used to decide the activity power (Bangsbo, 1994; Helgerud, 2001; Hoff, 2002). There have been a few endeavors to measure training load or TL in continuance sports (Banister, 1991; Foster, 2001; Morton, 1990). It is outstanding that HR illustrates a relatively direct association with VO_2max over a wide scope of consistent state submaximal practice powers (Astrand, 1986). This cozy connection between HR and VO_2max measures makes HR checking reasonable for evaluating exercise force in most exercise sessions. Since HR appears to be extraordinary compared to other target approaches to evaluate vigorous preparing force (Achten, 2003; Gilman, 1996), numerous strategies to evaluate the inside TL depend on HR observing (Banister, 1991; Morton, 1990).

As far as anyone is concerned, there are no investigations utilizing HR to screen the general interior TL of soccer sessions. Be that as it may, usually hone for some best proficient soccer groups to methodically screen TL utilizing HR methods. Apart from a few best level soccer groups, the standard utilization of HR-based strategy isn't generally doable because of issues, for example, the required specialized mastery, the tedious procedure of gathering HR information of all cooperative people each instructional course, and the cost of various HR telemetric frameworks. An extra issue with utilizing HR strategies for evaluation of inward TL in group activities, for example, soccer is that HR transmitter belts are not allowed during official aggressive

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matches. This is a vital impediment because the inside preparing load initiated by a match may speak to a relatively high level of the week after week preparing stack (Achten, 2003; Impellizzeri, 2004).

Physical preparation is the efficient reiteration of physical activities, and it can be depicted as far as its result or its procedure, that is, the preparation stacks (Viru, 2000). Though physical fitness tests are generally used to evaluate preparing results, the preparation procedure is frequently depicted as the outside load recommended by the coach. Be that as it may, the boost for preparing incited adjustment is the relative physiological pressure forced on the competitors inward TL and not the outer TL (Viru, 2000). Along these lines, to monitor and control the preparation procedure, it is vital to have a substantial measure of inward TL (Foster, 2001).

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This is especially significant in group activities where the arranged outer load is regularly comparative for each colleague because of the broad utilization of gathering activities, for example, small-sided games in group instructional meetings. An elective procedure to measure inward TL was proposed by (Foster, 2001). This straightforward technique measures interior TL increasing the entire preparing session rating of apparent effort utilizing the classification proportion scale by its length (Borg, 1987). This item speaks to in a solitary number the size of inward TL in arbitrary units (AU). Past research analyzing the legitimacy of this technique for estimating interior TL has appeared session-RPE to be identified with the percent of HR reserved in 30 minutes of unfaltering state running and to the time spent at various powers comparing to HR at lactate limits 30 minutes of consistent also, interim running (Foster, 1995). Other research has too demonstrated the session-RPE

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to altogether correspond to the HR-based technique for measuring inside TL proposed by Edwards in perseverance competitors (Foster, 1998; Edwards, 1993). The personal relationships between the session-RPE and Edwards' HR technique extended from 0.75 to 0.90 (Foster, 1998). Even though the session RPE technique was at first proposed for observing inside TL in perseverance competitors, this technique has as of late been connected to the ball, where preparing is described by both oxygen-consuming and anaerobic activities (Foster, 2001; Bangsbo, 2000).

The rpe-based technique is by all accounts a decent pointer of worldwide interior TL in soccer. This strategy does not require costly gear, for example, telemetric HR frameworks and might be exceptionally helpful and common sense for coaches to screen soccer player's inner TL (Impellizzeri, 2004). Moreover, the present comes about to recommend that the RPE-based strategy may aid the advancement of particular periodization techniques for people also, groups. Be that as it may, the direct relationships we found don't bolster this strategy as a substantial substitute of HR, as just around half of the difference in HR was clarified by session-RPE. This basic strategy can progress toward becoming an important instrument for coaches and game researchers to screen interior TL, however additionally thinks about are important to completely approve this TL evaluation system (Impellizzeri, 2004; Foster, 2001).

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2.6 Fitness Testing in Performance Monitoring Program

Even though there were still debates on the fitness performance improvement on the soccer players in pre-season, in-season, and during the transition phase at the end of the season, yet, there are still a lot of studies conducted on a performance monitoring system. The fitness test is the most relevant tool to monitor an individual's performance status. Performance monitoring program needs to properly plan as it is a part of chronic or long term outcomes from a training program implemented. A series of fitness testing in a certain duration of the performance monitoring program helps to ensure the training program is on track towards maximal performance achievement. From the fitness testing itself, a different angle of physiological characteristics can be examined.

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Due to these recorded effects of physiological characteristics, and performance monitoring program aiming at building up a fitness profile database is said to be useful for the selection and development process of a soccer team (Reilly, Bangsbo, & Franks, 2000). The outcome from the fitness profile database, preparing the training program becomes more accurate and effective especially when the position of play is influenced by the anthropometric and physical fitness profile involved (Marques et al., 2016). Besides that, the ability to change in direction and ability of sprinting also differ according to playing position (Bourgeois et al., 2017).

The output generated from the performance monitoring program which produced the fitness profile database should be reported and translated by in the simplest manner possible to the coaches or practitioners arise (Lockie, Risso,

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Giuliano, Orjalo, & Jalilvand, 2018). In building up the fitness profile database, choosing the appropriate test is the most important part of the process.

Laboratory tests normally highly accurate and desired by most sports scientists and physical conditioning coaches yet expensive and hard to get in nature although it provides better specificity (Monèm Jemni, 2018). Field tests on the other hand, much easier to be implemented and understood, yet validity and reliability may be questionable. In the end, for the sake of practicality, many had to resort to only using field test protocol and equipment (Bangsbo & Michalsik, 2002; Impellizzeri, 2006). But as long as the person in charge understood well how a test is affected in terms of reliability and validity by the way it is implemented, the tests chosen should have no problems to be correlated later on with standard data from lab tests available (Metaxas, 2005). The reliability and simple field test on a soccer-specific test need to be taken into consideration to make sure all the relevant areas can be tested and the dependent on laboratory test is minimize and the performance monitoring process still can be performed.

Besides the result and performance in a match, the player's performance also can be reflected in fitness testing, but a valid and reliable fitness test need to be done to ensure the outcome of the test is relevant to the environment or nature of the soccer match. Several studies have reported the relationship between the ability to keep on changes in direction and the strong ability of the players was highly significant. It was proven, in another method of improving eccentric training was by increasing a time taken in muscle eccentric activity (Bourgeois et al., 2017). Preliminary evidence also

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suggests that this form of training is effective for eliciting changes in a change of direction tasks that benefit the performance of a soccer player.

Particular field tests have been intended to evaluate continuance particular to soccer players, in any case, as far as anyone is concerned, none has been appeared to be straightforwardly related to the traditional VO_2max research center treadmill test (Bangsbo, 1992; Bangsbo, 1995; Nicholas, 2000). The Bangsbo irregular field test is anything but difficult to perform and impersonates the most noteworthy forces experienced during a soccer coordinate. It is satisfactory to players in light of its development similitudes to soccer, and the test is routinely used to evaluate soccer particular endurance (Bangsbo, 1994; Bangsbo, 1992; Bangsbo, 1995; Bangsbo, 1994; Reilly, 2000; Mujika, 2000).

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Though the vast majority of the amusement is vigorous, the most conclusive aptitudes, for example, the capacity to jump high and dash in duels against adversaries, are anaerobic (Bangsbo, 1994). Wisloff et al demonstrated a solid relationship between's maximal muscle quality, vertical hop execution, and 10– 30 m run times in all around prepared male world-class soccer players (Wisloff, 2004). Regardless of whether this connection additionally exists in more youthful, less all around prepared soccer players isn't known. The principal tests for estimating power, power, and run in soccer players are the vertical hop on a power platform and the 10 - 30 m sprint (Mujika, 2000; Wisloff, 2004; Cometti, 2001).

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The player's performance monitoring process can show the strengths and weaknesses of the players. Besides that, it is also reflected in the training program implemented in the field. From the data and information provided, the proper correction can be made on the training program and a detailed calculation on training stimulus can be made. The comparison of the published data can help to improvise the values and contribute towards a better practice on a field (Lockie, Risso, Giuliano, Orjalo, & Jalilvand, 2018).

The stimulus given on the training ground for sure created physiological stress on the players. The matchday demands and load also trigger a burn-out response from the players. To boost up or accelerate the recovery period, proper recovery programs need to plan. The enhancement of the player's performance depends on the recovery rate taken. Active recovery, passive recovery including technology application on recoveries such as compression garment usage, total body vibration, or neuromuscular stimulation seems to be popular nowadays. However, there is still no concrete evidence that can support all this kind of recovery methods and practical usage in a soccer nature (Rey, Padrón-Cabo, Barcala-Furelos, Casamichana, & Romo-Pérez, 2018).

Corresponding towards the maximum ability of player's performance, development program in term of fitness testing or performance monitoring also become a great challenge for a strength and conditioning coach, sports scientist or coaching team to identify an effective program or protocol including valid and reliable testing that can be used to suit the nature of soccer that also has been evolved drastically. This challenge appears to be greater if looking into the soccer complexity,

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dynamic, and mixture of physical characteristic performance. The information published need to cover up and serve all aspect or angle of physical fitness component without impairs the tactical, technical, and skill of the players. The fitness testing or players performance monitoring needs to be able to determine or indicate the effect of the training program implemented, player's intrinsic and extrinsic motivation, evaluate player's readiness to play in a match, evaluate player's condition before or after the injury phase, and most particularly, determine the strengths and weaknesses of the players (Cone, 2012).

The fitness testing or player's performance monitoring is usually conducted before the start of pre-season or before the season started. The first test is the baseline or starting point of value for the players. Then, from the result and descriptive data, the strength and conditioning coach or coaching team will design and prepare the whole season training plan or annual plan or some call periodization. The testing battery is supposed to be the same from the first test or pre-test towards the last test or post-test of the season. All the fitness testing or player's performance monitoring process should systematically organize or administered throughout the season to make sure a proper amendment or alteration can be done on the training program. The response in a fitness testing or player's performance monitoring process will be a guideline for a strength and conditioning coach or coaching team to re-build their training plan and program. A full of recovery should take into count before the fitness testing or player's performance monitoring process is conducted. The element of fatigue will affect the result of the test, hence, all players are advised to be tested at least two days after a match day (Turner, et al., 2011).

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There is a lot of fitness testing battery or player's performance monitoring protocol that can be used to determine the physical condition of soccer players. The choice of fitness testing battery or player's performance monitoring protocol depends on the needs and demands of the test outcome. Importantly, the test selected is must be high in validity and reliability towards the nature of the sports. The soccer-specific test should be listed as a top priority. In most of the studies conducted, significant changes can be seen from the beginning to the middle of the season. A plateau or stable result was recorded in the mid-season towards the end of the season. However, this data cannot be concluded as applicable to all soccer teams in a world because some other teams show improvement in mid-season and towards the end of the season (Thomas, 1979).

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As soccer players, physiological demands are high and the players must be able to cope with the intensity and nature of soccer sport. A player should competent and outstanding in a few physical fitness components. All of the physical fitness components will be reflected in a fitness testing or player's performance monitoring process. The soccer player's ability and condition can be determined through a laboratory test or field test. This kind of test can translate the actual performance of both amateur and elite levels into a figure of fact. Hence, in selecting a proper fitness testing battery or player's performance monitoring protocol, the proper and reliable method and equipment to be used need to be identified thoroughly. In a laboratory test, usually, that was conducted at the beginning of the season and the end of the season consumed much more time rather than on-field fitness testing. But, it can produce very specific and detailed data in evaluating the training program. On the other hand, field fitness testing will be more sport specific or sport related to the

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nature of the sport and will reflect on extra validity than a laboratory test. In terms of financial value and budget, a laboratory test will cost more than the on-field test based on the facilities and the equipment involved. Therefore, on-field fitness testing will be more convenient and user-friendly that can be used to extensively throughout the season. Since the individual test data will not affect the collective team performance in an actual match or competition day, the use of field tests can be seen as more practical as the testing environment also will be conducted in an actual nature of competition. The result produce by the fitness testing then should be a guideline for strength and conditioning coaches or coaching team in re-build or restructure a training program for the player (Svensson, 2005).

The debate between general fitness acquired by a running training program with a soccer-specific related fitness drill via small-sided games has been extended into a research study. The study was done to compare the effect of specific and general aerobic interval training on cardiovascular fitness and being measured through performance in a soccer match. The training load determines by a rating of perceived exertion and heart rate was recorded in every single training session and it was similar data recorded between groups. In the first four weeks of pre-season, there was a significant improvement showed in a match and cardiovascular fitness performance for both groups. Yet, in general, and specific aerobic interval training, there was no significant difference was found in any soccer-specific testing done. This is suggested that for both running and small-sided games will produce a similar or equal effective result in improving cardiovascular fitness among soccer players (Impellizzeri, 2006).

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A different position play in a soccer match will demand a different ability and characteristic of a physical fitness component. The outfield player's characteristic is similar between defender, midfielder, an attacker. But, the goalkeeper mostly tends to be heavier and higher, the flexibility of knee flexion and hip extension is higher than other players. In terms of maximum oxygen consumption or cardiovascular fitness, an outfield player tends to score high value rather than a goalkeeper. Successful of the team or club also is dependent on the performance of the players. The relationship between a player's physical fitness performances with team success was significantly interrelated and will reflect on each other. It is also suggested that team success maybe can be increased by looking into more detail in an injury prevention program and proper rehabilitation protocol on injured players (Arnason et al., 2004).

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One of the performance monitoring tools that are extensively used now is a Global Positioning System (GPS). It can measure a real-time variable and record all the needed data. Team training load that applies to the player can precisely be monitored and the objective of every training session can be determined. This will help the team to evaluate the training program that has been set before. However, any relevant outcomes from the GPS data need to be understood clearly. A better understanding of interpreting the data need to be established to ensure the correct measurement and manipulation can be suggested (Hennessy & Jeffreys, 2018).

The nature of soccer sport is very fragile and flexible according to the pattern of play and formation used in a club or team tactical. To make sure the players are trained in a real situation like a match day, a simulation that mimics match intensity and complex environment and response needs to be conducted. Small-sided games are

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the best method of training to simulate the real situation in a match environment. Small-sided games can be modified and mold according to the training objective and context set by the coaches. The adjustment in the condition of play, area of play, and numbers of players involved can be applied to simplify and benefit the specific purpose of the training session. A soccer-specific characteristic will take into consideration in planning a small-sided game for a player. All of the players will train to adapt to the match or game shape very quickly and the spontaneous response can be develop in autonomous muscle memory. Besides that, small-sided games are also proven to develop the physical conditioning of the players, technical ability, and tactical understanding performance (Impellizzeri, 2006). The complex nature in small-sided games creates a better value to develop a split-second decision making in unpredictable situations and creativity to counter the opponent movement. More engagement or involvement of the player due to a restricted playing area also will create a high motivational value in winning mentality attitude (Clemente, Martins, & Mendes, 2014).

Cardiovascular fitness capacity, aerobic power, speed-endurance maintenance, speed-endurance production, speed, strength and power, agility, and flexibility are required to be well prepared according to the physiological demands of soccer nature. In evaluating and assessing the player's performance, a suitable fitness testing need to be selected without overlooked on the validity and reliability of the test. From proper fitness testing conducted, a few information can be acquired, including a current condition of player's performance, the effectiveness of the training program, the strengths and weaknesses of every single player. This data also can allow the coach to develop a very specific and optimal training drill for the players without a miss out of

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any related or relevant area. Providing feedback for the players on their physical quality can enhance their motivation towards training session conducted (Sayers, & Binkley, 2008).

The benefits of cardiovascular endurance fitness training cannot be seen immediately. The effects and benefits are obtained if the training is conducted over a long and continuous period (Stanley Colcombe, 2004). Among the effects of physiological change and adaptation and benefits are the cardiac hypertrophy results from wall thickening and enlargement of the cardiac ventricular cavity. This condition benefits the increased heart strength of oxygen pumping more oxygen to muscle muscles. It helps in the production of energy to be supplied to muscle muscles and allows us to work longer. Besides that, it can decrease systolic and diastolic blood pressure especially during resting time for individuals with low hypertension levels. This condition reduces the risk of cardiovascular diseases such as hypertension, heart disease, and stroke (Richard Macko, 2005). Increase good cholesterol or high-density lipoprotein. The benefits reduce the risk of anemia associated with blood vessels such as atherosclerosis that can lead to hypertension, stroke, and heart disease. Other than that, increase capillary in muscles and organs, hence oxygen can be supplied to muscles that work efficiently for energy generation (Nader, 1988; McClelland, Godek, Chlad, Feairheller, & Morrison, 2018

Vigorous wellness with the greatest oxygen take-up, lactate limits, and running economy can be precisely assessed utilizing an assortment of research facility conventions during treadmill-running until weariness (Kriska, 1984). Although the qualities acquired with research center testing are viewed as the highest quality level

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for the estimation of oxygen-consuming wellness, the techniques included are tedious and require a prepared workforce and costly gear (Cooper, 1968). For these reasons, some field tests have been proposed as down to earth choices to research center appraisals, and they are usually utilized by coaches and connected game researchers to assess oxygen-consuming preparation results in soccer players (Leger, 1989). By a long shot, the most mainstream tests for aerobic control are the 20-m shuttle run test and the multistage fitness test (Krustup, 2001).

All the more as of late, Bangsbo proposed, for well-trained subjects, the Yo-yo Endurance Test Level 2 (YYETL2). Unique relation in a multistage fitness test and the 2m shuttle run test that begins at 8 and 8.5km-h, separately, the YYETL2 utilizes an underlying rate of 11.5 km-h. The utilization of YYETL2 has been proposed with the point of assessing VO_2max in very much prepared players in the endeavor to abbreviate evaluation session time (Bangsbo, 1996).

Infield settings, in any case, the utilization of game particular perseverance tests as execution measures of errands imitating specialized aptitudes, development designs, and physiological requests of the aggressive match-play is broad. The importance of these particular continuance tests is ordinarily in light of their consistent legitimacy. To date, just the Yo-yo Intermittent Recovery Test Level 1 (YYIRTL1) proposed by Bangsbo (Bangsbo, 1994) has been both remotely and inside approved (Krustup, 2001; Magni Mohr, 2003). Beginning at a speed like that utilized for YYETL2, YYIRTL1 comprises of 2 x 20m episodes of dynamic speed carry running, blended by 10 seconds of dynamic recovery, performed until weariness following pre-recorded acoustic signs (Bangsbo, 1994).

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The physiological strain related to the research center based soccer-particular discontinuous convention was like that related to 45 minutes of soccer coordinate play, in light of the factors estimated, showing the importance of the reproduction as a model of match-play work rates. Soccer-particular irregular exercise did not build the requests put on the oxygen-consuming vitality frameworks contrasted with constant exercise performed at a similar normal speed, even though the outcomes show that anaerobic vitality arrangement is more vital during intermittent than during persistent exercise at a similar normal speed (Drust, 2000).

It is essential that players and coaches approach target data on soccer player's physical status for group determination and preparing purposes. Physiological tests can give this data. Physiological testing in research facilities and field settings are extremely normal, however, the two techniques have been addressed on account of their specificity and exactness individually. At present, football players have their direct vigorous wellness surveyed in research centers utilizing treadmills or cycle ergometers, while aberrant measures (utilizing estimation of oxygen-consuming execution) are performed in the field, commonly containing various transport keeps running forward and backward finished a set distance. The audit discoveries organize field tests over lab tests, for product reason as well as for motivational and specificity reasons. Besides, examination writing recommends a blend of different tests to give a thorough evaluation of the players (Monèm Jemni, 2018)

An important issue of assessing a very focused football player's unique fitness considering the neuron dynamic properties of the mind as a piece of the focal sensory system. The logical writing survey permits to assume that exceedingly focused

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football player's extraordinary skill and play adequacy rely upon individual profoundly hereditarily decided neuron dynamic properties of mind as a piece of the focal sensory system, which incorporate utilitarian versatility, quality and the adjust of excitation and restraint. This caused the need for analyzing neuron dynamic properties pointers of physical wellness and specialized skill and assessing much-focused football player's playing and exceptional fitness (Volodymyr Lyzohub, 2017).

Soccer is a profoundly complex game influenced by numerous physical, mental, strategic, and specialized variables (Reilly, 2000). The physical requests expect players to have proper levels of fitness that enable them to stay focused for the match whole. In like manner, physical testing has increased more prominent acknowledgment over on going years and it currently appears to be ordinary inside an adolescent soccer player's timetable. A wide range of tests are accessible and more will likely develop later on. To be utilized with condensing in a reality setting, be that as it may, tests ought to be substantial, solid, and touchy. Numerous investigations have given this data in grown-up soccer players. In any case, a test ought not to be directed with condensing in a more youthful gathering, just because they are appeared to be proper for grown-ups (Hulse, 2013)

Intermittent tests appear the most suitable to survey soccer-specific continuance, of these the YoYo Intermittent Recovery test level 1 has the most grounded relationship with coordinate action. Speed testing, including 5 m and up to 30 - 40m is appeared to be dependable. Alter of course tests have high dependability though for rehashed alter of course tests it is marginally lower, while neither appears

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have fitting legitimacy. The influence of development and development ought to be considered when translating test comes about. An all-encompassing methodology considering physiological, anthropometric, mental, and expertise related appraisals are important. Until the point when we have more data on the long haul solidness, fitness tests have to be utilized deliberately and continually considering over their impediment (Darren Paul, 2015).

Validity is whether a convention takes after the execution that is being reenacted as nearly as could be allowed (Williams, 2006). He rectifies understanding of the test that comes about on an individual premise is connected to the unwavering quality of the test (Impellizzeri, 2009). The helpfulness of a test is dictated by its sensitivity, declined as the capacity of an instrument to gauge changes in a state (Beckerman, 2001).

Soccer expects players to often change between brief episodes of high power running and longer times of low force action (Bangsbo, 1994). Thus, typical feedback of constant tests is its application to intermittently based games, for example, soccer. To be sure, the emergence of intermittent tests has increased much acknowledgment and prominence. Illustrations incorporate the YoYo Intermittent Recovery Test (YYIRT), YoYo Intermittent Endurance Test (YYIET), and the 30 - 15 Intermittent Test, among others (Bangsbo, 1994; Buchheit, 2014; Castanga, 2014). Naturally, a test that incorporates the physical execution of a soccer coordinate does not exist. The YYIRT level 1 has, in any case, demonstrated a moderate to solid connection with add up to separate secured and high power movement in youth soccer players

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(Bangsbo, 1994). The connection between the YYIET2 and execution appears to be marginally lower.

Rebelo et al. announced estimations of 0.45, 0.29, 0.57 contrasted, and high power running, run, and high-intensity movement, individually. Thus, it is gathered that the YYIRT1 could enable a superior sign of to perform maximal exercise during a match (Rebelo, 2012). It appears, nonetheless, that position related contrasts are available for the YYIET2 though none were watched for YYIRT1 execution. At long last, an essential feature is that they have appeared to be dependable when utilized as a part of youth soccer players.

It appears to be intermittent tests are among the most ordinarily utilized tests in youth soccer players. Be that as it may, the professional ought to guarantee that the test outcomes are translated inside the setting of their restrictions. That is, test execution and match action ought not to be viewed as basic circumstances and results in a relationship (Drust, 2007; Gonaus, 2012).

Physical testing has increased more noteworthy acknowledgment over on going years and is presently ordinary inside a soccer club setting. The YoYo intermittent tests appear to have the most grounded relationship with high power movement during organizing play. Test determination, in any case, relies upon the fundamental physical quality that is assessed and in this manner the group's theory as far as preparing (Darren Paul, 2015).

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Although the alter of course tests are ordinary they are restricted exclusively to the physical characteristics and do not have any data concerning the cognitive perspective. Even though this might be relevant for all tests, it appears this thought is more settled in nimbleness, given the presence of some receptive spryness tests. It might be worth seeking after territories of research that incorporate both a physical and subjective component (Bangsbo, 1994; Darren Paul, 2015).

The physiological requests of a football game are those of intermittent and high-power actions, with high vitality use (Mendez-Villanueva, 2011; Tolen, 2005). Oxygen consuming force is a vital variable in this setting since it acts in the recuperation of such endeavors, empowering more viable support of competitors during the match (Tolen, 2005; Bangsbo, 2006; Bradley, 2011; Hoff, 2005).

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There is a significant understanding that the most extreme incentive for take-up, transport, and utilization of oxygen is a decent pointer of the working of the respiratory, cardiovascular, and musculoskeletal frameworks. This is one reason why look into has indicated extraordinary enthusiasm for the assurance of VO_2max, in an immediate or circuitous way, encouraging the comprehension of physiological viewpoints identified with execution during matches (Larissa Bobroff Daros, 2012).

Field tests, particularly for soccer, are well known among coaches as a result of the straightforwardness, validity, and minor utilization of gear (Bradley, 2011; Mirkov, 2008; Wragg, 2000).

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In this unique situation, the logical research looks to examine contrasting options to the evaluation of VO_2max in a more down to earth way concerning the day by day exercises of soccer groups. Consequently, conditions have been created to appraise this variable from straightforward measures, for example, remove voyaged, speed achieved, a period is taken, greatest heart rate recorded during the test, accordingly improving their evaluation in soccer groups (Larissa Bobroff Daros, 2012).

The field test convention might be favored over the treadmill convention, as the player is presented to genuine amusement conditions since he plays out the test in the field, wearing soccer spikes rather than the research facility conditions. Additionally, the field test convention is effortlessly actualized and hence, helpful in soccer preparing arranging (Metaxas, 2005).

This field test can be received by coaches and connected in prepared soccer competitors, setting up the greatest vigorous intensity of competitors in Juvenile and Junior classifications with bringing down expenses and time spared that can be utilized as a part of preparing. Another imperative factor in the field test is the biological legitimacy of the test since the competitor performs in conditions that are more like those of a genuine match such as a field test that will be conducted on the grass and wearing soccer spikes (Larissa Bobroff Daros, 2012).

To adapt to the physiological requests of soccer, players must be capable over a few wellness parts. The utilization of wellness tests in the lab and field help with inspecting soccer players' abilities for execution both at the beginner and world-class

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levels. Research center tests give a valuable sign of a player's general wellness. Exact test outcomes can be gotten with the utilization of an intensive philosophy and dependable gear. Research center tests are utilized sparingly during the season on account of the tedious idea of the tests. Rather, tests are by and large did towards the beginning and end of the pre-season period to assess the viability of particular preparing intercessions.

Field tests give comes about that are particular to the game and are in this manner more substantial than research facility tests. The decreased cost, utilization of negligible gear, and the straightforwardness with which tests can be led make them more advantageous for broad use all through the season. Even though information from lab and field tests gives a decent sign of general furthermore, soccer-particular wellness, singular test outcomes can't be utilized to anticipate execution in coordinate play indisputably in light of the intricate idea of execution in the rivalry. Fitness tests in conjunction with physiological information ought to be utilized for checking changes in players' fitness and for controlling their preparing solution (Svensson, 2005).

Perseverance limit in soccer players is imperative. A soccer particular test for organizing estimation of maximal oxygen take-up does, in any case, not exist. The testing of maximal oxygen take-up during soccer particular testing gives comparative outcomes as during treadmill running, and in this manner fills in as a legitimate trial of maximal oxygen take-up in soccer players (Kemi, 2003).

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Physiological evaluation of soccer preparing, for the most part, refers to the estimation of anatomical, physiological, biochemical, and useful changes particular to the game teach. The quality, amount, and association of physical activities are, then again, normally portrayed by the outside work forced by the coach on his or her competitors. The physiological push as interior load prompted by such preparation frequently varies between people (Impellizzeri, 2005).

Aggressive soccer connects with huge numbers of the body's frameworks to a noteworthy degree. The musculoskeletal, anxious, resistant, and metabolic frameworks are worried to a point where recuperation procedures post-practice end up powerful in getting ready for the following match (Reilly, 2005).

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Serious movement at seven days preparing camp makes members encounter brought down convergences of non-executioner cells and T-assistant cells. Two continuous amusements in 24 hours create aggravations in the testosterone-cortisol proportion. At the point when aggressive timetables are congested, the recuperation procedure ought to be improved for execution capacities to be re-established to typical as quickly as time permits. There is proof that glycogen stores are decreased close to consumption toward the finish of a soccer match and that an eating routine high in starches can help recuperation (Reilly, 2005).

Water alone isn't the best method for re-establishing body-liquids since carbohydrate-electrolyte drinks show better intestinal ingestion and lessen pee yield. Some alleviation from muscle soreness might be accomplished by methods for a warm-down. Profound water running regimens can supplant regular physical

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preparation in the days after rivalry. Backrub cryotherapy and elective treatments have not been appeared to be reliably powerful. It is presumed that improving recuperation post-practice relies upon a blend of components that consolidate a thought of individual contrasts and way of life factors (Reilly, 2005).

The systems to encourage recuperation procedures should begin promptly the diversion or preparing wraps up. Match executives and competition organizers ought to think about the unpleasant results for players in times of congested apparatuses and lighten the physiological strain quite far by permitting 72 hours between aggressive diversions. This recurrence of rivalry is probably not going to be practical in the long term (Reilly, 2005).

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The action profile and physical requests of ball games, for example, basketball and soccer have been considered widely finished the most recent decade (Ekblom, 1986; Krustup, 2005; Magni Mohr, 2003; Krustup, 2006). It is currently settled that these sports are intermittent, with action changes each 3 - 5 seconds and are physically requesting a result of various brief, extreme activities including bounces, turns, handles, high speed runs, and dashes (Magni Mohr, 2003; Krustup, 2003). Moreover, heart rate chronicles and the gathering of muscle and blood tests have demonstrated that the oxygen-consuming stacking is high all through ball and soccer matches and that the anaerobic vitality turnover is high during times of the diversion (Bangsbo, 1991; Ekblom, 1986; Krustup, 2006; Mcinnes, 1995).

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The determination in regards to a high rate of anaerobic vitality turnover during times of tip-top soccer matches is further upheld by the on-going finding that global world-class soccer players perform twice as much high-power running in the most extraordinary 5 minutes period as the amusement normal and that run capacity is incidentally decreased after an extreme practice period (Krustup, 2006; Magni Mohr, 2003).

Various physical tests have been utilized to assess the preparing status of first-class soccer players as indicated by contrasts in age, playing the position, and first-class level (Bishop, 2001; Cooper, 1968; Ferrari, 2005; Krustrup, 2003; Krustrup, 2005; Leger, 1982; Ramsbottom, 1988). Most of them comprise of ceaseless exercise, and the significance of these tests in ball games has been addressed (Bangsbo, 1994; Castagna, 2005; Krustup, 2001; Krustup, 2003).

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On the other hand, two discontinuous field tests, the Yo-Yo Intermittent Recovery Level 1 test (Yo-Yo IR1) and the bus run test, have been observed to be identified with the aggregate sum of high-power practice during soccer matches (Ferrari, 2005; Krustup, 2001; Krustrup, 2005).

These tests have additionally been appeared to have high reproducibility and to be touchy to preparing adjustments. Be that as it may, since the Yo-Yo IR1 test comprises of 10 – 20 min of rehashed episodes of high-power high-impact work, and because the various carry test comprises of six 6 to 7 seconds runs blended with 20 seconds rest periods, neither of these tests is ideal for assessing the capacity to perform high-force practice with an expansive rate of anaerobic vitality generation in

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a mix with a high oxygen-consuming vitality turnover (Bishop, 2001; Ferrari, 2005; Krustup, 2001; Krustrup, 2003).

One irregular field test that may meet the necessities of synchronous incitement of the high-impact and anaerobic vitality framework is the Yo-Yo Intermittent Recovery Level 2 test (Yo-Yo IR2 test) (Bangsbo, 1994). This test endures 2 – 10 minutes and comprises of 20m carry keeps running at quickly expanding speeds blended with 10 seconds times of dynamic recuperation. The Yo-Yo IR2 test has been utilized for testing in various games, for example, b-ball and Australian football, yet the test has not yet been examined as far as physiological reaction also, reproducibility. In like manner, the test still should be inspected to decide if it is a touchy device to assess the exceptional intermittent exercise execution of soccer players in various occasional periods, at various focused levels, and in various playing positions (Oliveira, 2000; Young, 2005).

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The present examination shows that the Yo-Yo IR2 test can be utilized to assess an athlete's capacity to perform the extreme irregular exercise with a high vigorous vitality generation also, a critical commitment of the anaerobic vitality framework. The test has high reproducibility and affectability and can be used to look at changes in irregular exercise execution of competitors, for example, soccer players. The Yo-Yo IR2 test has all the earmarks of being ideal for assessing the capacity to perform rehashed extraordinary exercise because both the vigorous and anaerobic frameworks are intensely invigorated. The peak heart rate during the Yo-Yo IR2 test was the same as the peak heart rate saw during the comprehensive treadmill test in

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which the members achieved their maximal oxygen take-up. A comparable reaction was acquired when the Yo-Yo IR1 test was assessed (Krustup, 2003).

The urgent distinction between the two tests was the incitement of the anaerobic framework. In the Yo-Yo IR2 test, the CP level toward the finish of the test was lower and the rate of CP use in the last period of the test was essentially higher contrasted and the IR1 test. Moreover, the muscle lactate focus at the finish of the test was higher in the Yo-Yo IR2 than in the IR1 test, and the rate of lactate collection in the last period of the test was around five times bigger. In like manner, muscle pH was bringing down at depletion in the Yo-Yo IR2 than in the IR1 test (Bishop, 2001; Bangsbo, 1994).

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What's more, in the Yo-Yo IR2 test, the rate of lactate collection in the blood during the last period of the test and the pinnacle blood lactate focus were higher contrasted and the Yo-Yo IR1 test. All in all, the rate of anaerobic vitality generation and, particularly, the rate of lactate generation towards the finish of the Yo-Yo IR2 test were high. Additionally, the higher normal rate of muscle glycogen use during the Yo-Yo IR2 contrasted and the Yo-Yo IR1 test proposes that the rate of glycolysis was more articulated during the Yo-Yo IR2 test (Bangsbo, 2006).

The blood lactate fixations were at the same level as saw during ball games and at times during soccer matches, recommending that the metabolic reactions saw during the test speaks to those saw in times of ball games. Accordingly, while the Yo-Yo IR1 test centers on the capacity to over and over-perform oxygen-consuming high-power work, the Yo-Yo IR2 test analyses the ability to perform the extraordinary

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irregular exercise with an extensive anaerobic part in a mix with a critical high-impact commitment (Mcinnes, 1995; Jan Helgerud, 2001; Krustup, 2006).

The muscle lactate level was still high 3 minutes into recuperation, and the blood lactate fixation peaked after 6 minutes and was high 15 minutes after the test. Regardless of high muscle lactate fixations after the test, the normal rate of muscle lactate discharge was drop as it was in the initial 3 minutes of recovery (Bangsbo, 2006).

Soccer at an abnormal state is described by a lot of high-force practice being performed during the match. In this manner, players at a universal top-level have been appeared to perform 25% all the more high-force running and 35% more dashing in aggressive recreations than proficient players at a direct first-class level (Magni Mohr, 2003). When looking at the execution of players from the first-class group with players at lower levels, it was likewise certain that world-class players performed better on the Yo-Yo IR2 test. The correlation between players in various positions uncovered that the focal safeguards, fullbacks, and midfielders would be wise to execution than the aggressors and goalkeepers. The finding that the focal safeguards were in the same class as the fullbacks and midfield players was as opposed to what was seen as far as VO_2max and when their execution was thought about in the Yo-Yo IR1 test as well as an incremental treadmill test to depletion (Bangsbo, 1994; Krustup, 2005).

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As needs are, the Yo-Yo IR2 test was most certainly not associated with dash execution. Additionally, the absence of connections among the Yo-Yo IR2 test, muscle catalysts, what's more, fiber-type dispersion propose that no single factor decided a subject's capacity to play out this kind of activity. It was watched that the soccer players had a 27% change in Yo-Yo IR2 test execution during the first 4 weeks of a planning period for another season and a 42% change during the whole 8 weeks' time of planning. Subsequently, it gives the idea that the player's capacity to perform rehashed high-force practice was changing extensively and that the test was touchy to such changes. These progressions might be contrasted and the little increments in VO_2max watched in the preseason readiness for a top-class referee and tip-top soccer players (7%). The level of wellness toward the finish of the season was lower than toward the beginning of the season (Krustup, 2001; Krustrup, 2003).

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In outline, the Yo-Yo IR2 test looks at the capacity to perform rehashed high-force practice with nearly the most extreme oxygen-consuming vitality creation and a high rate of anaerobic vitality turnover. The test has a high reproducibility what's more, affectability. Along these lines, singular contrasts and changes in the execution of competitors in sports utilizing extreme intermittent exercise can be analyzed in a straightforward way (Krustup, 2006).

Legitimacy is whether a convention takes after the execution that is being reenacted as nearly as could be allowed (Williams, 2006). He rectifies the understanding of the test that comes about on an individual premise is connected to the unwavering quality of the test (Impellizzeri, 2009). The helpfulness of a test is

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dictated by its sensitivity, declined as the capacity of an instrument to gauge changes in a state (Beckerman, 2001).

2.7 Summary

Efforts to improve soccer performance often focus on technique and tactics at the expense of fitness and applied physiology (Hoff & Helgerud, 2004). The nature of intermittent team sports can be tested using the yoyo intermittent test and the sprinting ability of the players can be evaluated by a 20-meter sprint test. The indicator of under training or over training also can be detected by fitness testing. However, the relationship between all of these variables needs to be investigated to make sure the optimal result for the player's performance can be produced. Performance monitoring determines an athlete's performance was highly suggested as the response towards stimulus is differ between an individual (Bourgeois et al., 2017). The needs and demand in pursuing an individual maximum performance come along with the high needs and demand in monitoring the soccer player's performance.

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CHAPTER 3

METHODOLOGY

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3.1 Introduction

This chapter discussed the methodology that was used to serve the purpose of the study. The main aim of the study is to examine the relationship between the player's sprint time, cardiovascular fitness, and sRPE during in-season performance monitoring.

3.2 Research Design

The research design for this study was a descriptive case study. All of the training program and fitness testing protocol or performance monitoring plan was decided by the head coach of the team based on their training plan towards pre-season and in-season match preparation. There was no treatment given or applied in this study. This

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study was descriptive of the current status of the team performance in their performance monitoring plan. The dependent variables in this study were the sprinting time, YYIR1 test score, and sRPE score. All of these variables were tested in six series of fitness testing throughout the four-month of the performance monitoring program. Later, all of the data collected has been analyzed to compare the performance in sprinting and cardiovascular fitness throughout the study conducted. The data also then analyzed to examine the correlation between cardiovascular fitness performance and the sRPE score level.

3.3 Research Participants

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30 participants were selected to participate in this study (n=30). All of the participants were purposely selected from PKNP's FC professional soccer players. All participants were actively participated in a team training program and clear from any major injuries which need a rest for more than one week. The data collection process has been done throughout the fitness testing in a player's performance monitoring process during in-season. Player's age (mean±SD), height, and weight were also recorded as stated in Chapter 4, Table 4.1.

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3.4 Equipment and Instrument

A multi-weight and height (Kyoto, Japan) scale were used in this study to measure the height and weight of the players. To measure a distance of 20m sprint and YYIR1, a 50m normal measurement tape was used. To measure a sprint time, a handy sport Casio stopwatch was used. The cardiovascular fitness performance test was conducted using the Yoyo Intermittent Recovery Level 1 test protocol (APPENDIX J) (Bangsbo et al., 2008).

3.5 Procedures

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The data for this study were collected on the actual fitness testing or performance monitoring program of the team. There was no treatment applied to the team as this study was focusing on the actual case study. The fitness testing plan or performance monitoring program has been decided by the head coach and the physical conditioning coach of the team according to their training program and match schedule throughout the season. All participants were brief on the study conducted on the first fitness testing session and the informed consent form was provided. In every fitness testing session, the participants underwent a standardized warm-up protocol, 20m sprint test, Yoyo Intermittent Recovery Level 1 (YYIR1) Test, and sRPE data collection. All of this procedure was conducted continuously after one and another in a single session with interval resting time provided.

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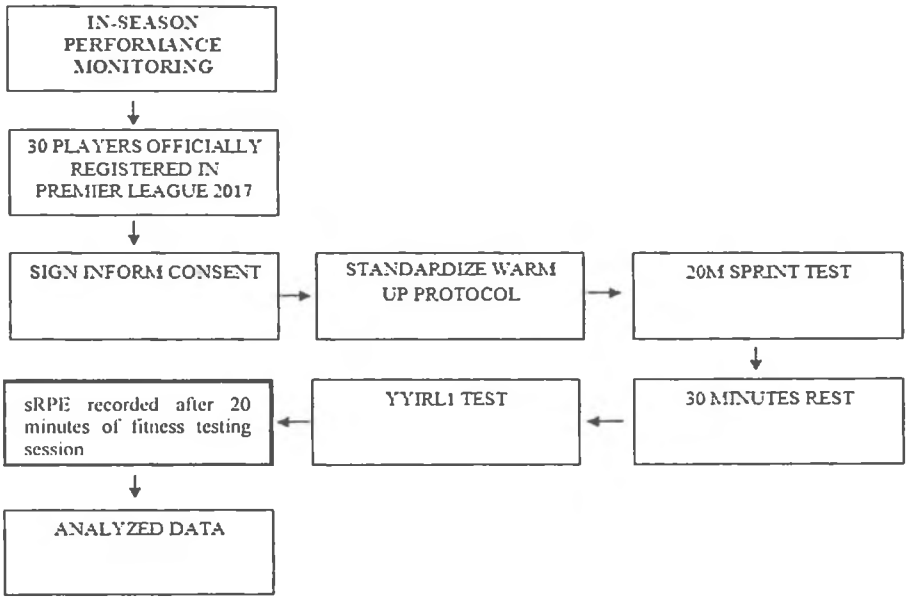


Figure 3.1 Data Collection Process

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3.5.1 Time Frame

There were six series of fitness testing conducted within four-month of performance monitoring program throughout the pre-season and in-season training session in preparation for the match.

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3.5.2 Testing Time, Surface, and Attire

All the fitness testing was conducted in the afternoon session and clear and sunny weather. The testing was also conducted in an actual training ground of the team which is a cow grass field and all the players were using a training uniform and soccer boots.

3.5.3 Nutrition and Hydration Level

One day before every testing was conducted, the head coach of the team reminds and advice all the participants on the upcoming testing day and proper nutrient uptake for them to prepare for the test. In terms of the hydration level of the participants, they keep practicing their normal routine on keeping hydrated, and no hydration monitoring provided. All of the nutrition uptake and hydration level status was fully depend on the normal routine of the participants as the study also conducted in an actual case study environment.

3.5.4 Inform Consent

At first, all participants verbally brief about the test followed by health and injury status assessment. They have then signed an informed consent form. All participants also have been brief about the significance of this study to encourage them to participate and proud to become the main part of this study.

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3.5.5 Warm-Up

Before every testing session, the participants performed a standardized 10 minutes warm-up protocol which includes a slow jog, sideways running, backward running, dynamic quadriceps stretch, hamstring stretch, walking squats, walking lunges, groin stretch, and walking calf raise. Immediate after the warm-up, all participants were given 5 minutes of personal body-check which is they were free to do any stretching on their own, as all the participants have different needs on their physical preparation. A 5 minutes body check means, all participants were given free time to perform a personal stretching or warm-up drill based on their own needs. This personal body-check was included as a standardized warm-up protocol. After 5 minutes of body-checking, the participants ready for the test.

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3.5.6 20m Sprint Test

Immediately after a personal body-check, the fitness testing started with the 20m sprint test. The 20m sprint test was a maximal sprinting effort testing on the players. The players were on a ready position at the starting line, with a standing start and at least one foot touches the starting line, the participants ready and started the sprint on their own while the timekeeper took the sprint time manually at the finishing line. Once the players take off from the starting line, automatically the timekeeper starts the stopwatch and stop the watch once the torso of the player reaches the finishing line. The timekeeper was standing parallel at the finishing line. Another cone was placed at the 30m mark as a guideline and target for the participants to make sure they

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were not slowing down while approaching the finishing line. The participants aim to finish at the 30m mark and they were at their maximum speed when approaching the finishing line at the 20m mark. All participants underwent three trials and the best time was recorded to be analyzed. The resting time in between trials was 1 minute 30 seconds.

3.5.6.1 Timekeeper for 20m Sprint Test

The timekeeper for this study was the physical conditioning coach of the team. The timekeeper was the same person for every tested participant and every testing session. The timekeeper standing parallel with the 20m finishing line for him to saw the torso of the participants pass the finishing line. A manual timekeeper was used in this study because this was the actual fitness testing procedure conducted by the team. If the time gate was used in this study, it will not reflect the normal routine procedure of the team.

3.5.7 Yoyo Intermittent Recovery Level 1 (YYIR1) Test

Thirty minutes after the sprint test completed all the players were briefly explained on the second test which was a cardiovascular endurance test. After finish, the briefing session, the Yoyo Intermittent Recovery Level 1 (YYIR1) test was conducted. The YYIR1 focuses on an individual's ability to repeatedly perform high-intensity aerobic work. The submaximal yoyo intermittent recovery test was developed as a performance monitoring method during competitive periods, injury rehabilitation, or

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individuals who may struggle with performing the maximal tests. The YYIR tests are a simple method for examining an athlete's capacity to perform repetitive high-intensity aerobic exercise. YYIR1 protocol is an incremental speed of 2 x 20-meter shuttle run with the recovery of 5-meter distance in 10 seconds. The speed of between the beep sound is progressively increased throughout the test and the participants need to adapt and adjust the running speed according to the beep sound. The participants need to place at least one foot on the starting line before start with a beep sound. They had to reach the starting line before the beep sound and only can leave the starting line after the beep sound. The participants performed a shuttle run as much as possible according to the sound recorded and given one time warning before being eliminated if unable to reach the starting line according to running speed for the second time. That's means if the participants fail to reach the starting line in the allocated time, it is considered one fail. If this happens a second time, then they were eliminated. The participants perform a maximal shuttle run in this test. Once eliminated or withdrawn from the test, their shuttle score were recorded.

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3.5.7.1 Scoring and VO_2max Prediction Calculation

Scoring on this test was calculated based on the level achieved by the participants. The last level completed by the players was recorded and later calculated for VO_2max ($ml \cdot kg^{-1} \cdot min^{-1}$) prediction. However, the total distance covered by the participants also needs to be calculated because it was needed in the VO_2max prediction calculation. To calculate a total distance, the number of shuttles completed by the participants multiplies by 40m. The example, if the participants perform 35 shuttles,

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this number of shuttles then multiply by 40m (35 x 40m = 1400m). To calculate the VO_2max prediction, the equation was used (VO_2max [$ml \cdot kg^{-1} \cdot min^{-1}$] = Total distance (m) x 0.0084 + 36.4). For data analysis, the figure of VO_2max in $ml \cdot kg^{-1} \cdot min^{-1}$ was used (Bangsbo et al., 2008).

3.5.8 sRPE

20 minutes after the eliminated or voluntary stop from the YYIR1 test, the assistant coach of the team approaches the participants and asked the sRPE score. The printable RPE scale (APPENDIX G) showed to the participants and the number of scales was declared. The RPE score recorded was considered as sRPE because it was taken at the end of the fitness testing session as it was considered as one session of the testing procedure. All of the testings were conducted in the same session and continuous after one and another with a proper recovery time given. The data were analyzed to examine the relationship between 20m sprint time, YYIR1, and sRPE.

3.5.9 Familiarization on Testing and sRPE Scale

All participants were aware and familiar with the testing conducted since they were experienced the same testing procedure in a year before. All participants already underwent the same testing procedure and protocol for more than ten times before the study was conducted. On the sRPE scale procedure, all participants were familiarized and understood on the practice as it was a daily routine conducted by the assistant

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coach of the team at the end of every training session. But there was no proper documentation on the data and the data was used by the head coach daily in identifying the training intensity or training load in every training session.

3.6 Data Analysis

The data for this study was collected from the PKNP FC professional soccer player. The data collected from the study enable investigation on the relationship between the player's sprint time, cardiovascular fitness, and sRPE during in-season performance monitoring. The data for sprint time and cardiovascular fitness was acquired by the 20m sprint test and Yoyo Intermittent Recovery Level 1 (YYIR1) test, whereas the data for sRPE were collected 20 minutes after every training session and fitness test conducted. All these data were then used to analyzed and find out the significant relationship in this study.

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3.7 Statistical Analysis

Based on the data collected, the relationship between the three variables was identified using the correlation coefficient statistic calculation. There was only one group of subjects or participants and the fitness testing has been conducted for six series throughout the four-month of the performance monitoring program. Repeated Measures were used to measures the significant improvement in 20m sprint performance and cardiovascular fitness performance throughout the six series of

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testing. Whereas, the Pearson Correlation Coefficient was used to find out the significant relationship between sRPE with cardiovascular fitness performance and the relationship between 20m sprint performance with cardiovascular fitness performance.

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CHAPTER 4

RESULT

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4.1 Introduction

The purpose of this study was to examine the relationship between 20m sprint performance, cardiovascular fitness performance, and sRPE on PKNP FC professional soccer players during the in-season player's performance monitoring program. The variables tested were the 20m speed test and Yoyo Intermittent Recovery Test Level 1 (YYIR1). On the other hand, the sRPE was recorded in every training session and fitness testing session. The data collected from this study were then analyzed and the result presented in the next paragraphs.

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4.2 Descriptive statistic of demographic data

For this study, 30 participants were selected from the PKNP FC professional soccer players. The descriptive statistic of demographic data such as age, height, and weight were collected and shown in a table below.

Table 4.1

Descriptive Statistic of Demographic Data

	Age (mean ± SD)	**Weight (mean ± SD)**	**Height (mean ± SD)**
Mean	24.68 ± 3.12	69.38 ± 8.45	176.15 ± 7.48
Minimum	21.1	55	163
Maximum	32.7	84	190.5

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The table shows the average of the descriptive characteristics of the sample. The player's age range was between 21.1 - 32.7 years old with a mean of 24.68 ± 3.12 years and the player's weight range was between 55kg - 84kg with the mean of 69.38 ± 8.45 kg. On the other hand, the height was within 163cm – 190.5cm with a mean of 176.15 ± 7.48 cm.

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4.3 Findings

The data for this study has been collected throughout the pre-season and in-season of the team's actual training session. There were six series of fitness testing has been conducted throughout the four-month of the performance monitoring program. There were numbers of finding that has been identified within this study.

4.3.1 The Relationship between Sprint Time and Cardiovascular Fitness Performance

Based on the data recorded, the relationship between 20m sprint performance and cardiovascular fitness performance has been investigated. The analysis on correlation shows, there was a significant relationship between 20m sprint performance and cardiovascular fitness performance which was tested by YYIR1. All six series of player's performance monitoring data comprised a result of 20m sprint and YYIR1 was analyzed and all of them are related to each other. The p-value was set at 0.01 and the result shows a significant relationship between both of the variables. It was suggested that an improvement in cardiovascular fitness performance also will lead to reducing in 20m sprint time and vice versa. On the other hand, as stated in table 4.2, it was also can be concluded as one variable is related to another variable and if one of the variables was not well trained and maintain, it will affect another variable.

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Table 4.2

Correlations between Sprint Time Performance and Cardiovascular Fitness Performance based on the Pearson Correlation Coefficient

Variables	Pearson Correlation	Sig. (2-tailed)
S1-Y1	-0.72	0.00
S2-Y2	-0.75	0.00
S3-Y3	-0.60	0.00
S4-Y4	-0.50	0.00
S5-Y5	-0.55	0.00
S6-Y6	-0.61	0.00

Correlation is significant at the 0.01 level (2-tailed).

S=sprint time (sec), Y=YYIR1 ($ml \cdot kg^{-1} \cdot min^{-1}$)

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4.3.2 The Relationship between Sprint Time and Srpe

Based on the data collected, the relationship between sprint performance and sRPE has been examined. There was no significant relationship between both of these variables. As per simplified in Table 4.3, all 20m sprint and sRPE data throughout the study have been analyzed and produced no significant relationship result.

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Table 4.3

Correlations between Sprint Time Performance and sRPE based on the Pearson Correlation Coefficient

Variables	Pearson Correlation	Sig. (2-tailed)
S1-SRPE1	0.00	0.97
S2-SRPE2	-0.00	0.97
S3-SRPE3	-0.04	0.82
S4-SRPE4	-0.16	0.38
S5-SRPE5	-0.36	0.05
S6-SRPE6	0.06	0.72

Correlation is significant at the 0.01 level (2-tailed).

S=sprint time (sec)

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4.3.3 The Relationship between Cardiovascular Fitness Performance and sRPE

Refers to data collected, there was no significant relationship between YYIR1 and sRPE. According to Table 4.4, there was no significant relationship between cardiovascular fitness performance and sRPE. The sRPE was recorded in every training and fitness testing session. As mention before, the result between both of these variables was recorded and analyzed to investigate the significant relationship either the positive or negative improvement of one variable will affect another variable. Hereby it can be suggested, that both of these variables have no significant relationship. In every test, there was no significant relationship between sRPE and cardiovascular performance, the variable was not significant to each other. Even Y1 on other sRPE data (Y1-SRPE1, Y1-SRPE2, Y1-SRPE3, Y1-SRPE4, Y1-SRPE5, Y1-

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SRPE6) there was no significant relationship on the variables. It was also applied to the other tested data.

Table 4.4

Correlations between Cardiovascular Fitness Performance and sRPE based on the Pearson Correlation Coefficient

Variables	Pearson Correlation	Sig. (2-tailed)
Y1-SRPE1	-0.13	0.47
Y2-SRPE2	0.10	0.59
Y3-SRPE3	-0.03	0.87
Y4-SRPE4	0.48	0.00
Y5-SRPE5	0.31	0.08
Y6-SRPE6	0.20	0.27

Correlation is significant at the 0.01 level (2-tailed).

Y=YYIR1 ($ml \cdot kg^{-1} \cdot min^{-1}$)

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Table 4.5

Profile Data for 20m Sprint (sec) & YYIR1 ($ml \cdot kg^{-1} \cdot min^{-1}$)

Variables	Test 1 (mean± SD)	Test 2 (mean± SD)	Test 3 (mean± SD)	Test 4 (mean± SD)	Test 5 (mean± SD)	Test 6 (mean± SD)
20m Sprint	3.59±0.36	3.31±0.25	3.18±0.16	3.19±0.15	3.23±0.15	3.20±0.14
YYIR1	68.65±3.88	72.57±3.81	74.62±5.03	75.40±5.45	75.40±5.45	75.40±5.45

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4.3.4 Sprint Test Performance

In four months of the player's performance monitoring program, six series of fitness testing has been conducted. 20m sprint performance and cardiovascular fitness performance data have been collected and analyzed. Based on the result of the finding as per Table 4.5, several data can be discussed. For 20m sprint time, in Test 1 which was also considered as a baseline pre-test, the player's time is 3.59 ± 0.36 sec. Test 2 result shows improvement with 3.31±0.25 sec. Test 3 and Test 4, 3.1 8± 0.16 sec and 3.19 ± 0.15 sec. For the last two series of testing, 3.23 ± 0.15 sec was recorded for Test 5 and in Test 6, the players recorded 3.20 ± 0.14 sec. In every testing conducted, the players keep showing an improvement in sprint time performance.

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In comparison throughout the in-season player's performance monitoring series, the sprint performance of the players also shows a significant improvement. As stated in table 4.6, in six series of 20m sprint tests conducted, the time taken by the player to perform the sprint is improved. Test 1 was considered as a pre-test or baseline on the player's performance otherwise Test 6 was considered as a post-test. Test 1 time was 3.59 ± 0.36 sec and Test 6 was 3.20 ± 0.14 sec. A comparison between Test 1 and test 6 showed a significant improvement. All of the other tests also showed a significant improvement in sprinting performance time. The time taken to complete the 20m sprint was reduced and reflect the sprinting ability of the players was improve from Test 1 to Test 6. The comparison for Test 1 to Test 6 was analyzed by Repeated Measures analysis and it was suggested there was a significant improvement in 20m sprint performance.

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Table 4.6

Sprint Time Performance based on Repeated Measures

Variables	Mean Difference	Std. Error
S1-S2	0.28	0.04
S1-S3	0.41	0.04
S1-S4	0.40	0.05
S1-S5	0.36	0.05
S1-S6	0.39	0.05
S2-S3	0.13	0.02
S2-S4	0.11	0.02
S2-S5	0.08	0.03
S2-S6	0.11	0.02
S3-S4	-0.01	0.01
S3-S5	-0.04	0.01
S3-S6	-0.01	0.01
S4-S5	-0.03	0.00
S4-S6	-0.00	0.00
S5-S6	0.02	0.00

Significant is set at 0.05 level.

S=Sprint time (sec)

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4.3.5 Cardiovascular Performance

A series of player's performance monitoring process also shows a significant positive value on cardiovascular fitness performance. Table 4.5 shows, in Test 1, the result of 68.65 ± 3.88 $ml \cdot kg^{-1} \cdot min^{-1}$ was recorded. The result shows significant improvement in the next series of fitness testing conducted from Test 2 to Test 5, but in Test 6, the result remains same as a Test 5. 72.57 ± 3.81 $ml \cdot kg^{-1} \cdot min^{-1}$ and 74.62 ± 5.03 $ml \cdot kg^{-1} \cdot min^{-1}$ were recorded in Test 2 and Test 3 whereas in Test 4 75.40 ± 5.45 $ml \cdot kg^{-1} \cdot min^{-1}$, Test 5 75.40 ± 5.45 $ml \cdot kg^{-1} \cdot min^{-1}$ and Test 6 75.40 ± 5.45 $ml \cdot kg^{-1} \cdot min^{-1}$. As referred to in Table 4.4, it is suggested that there is a significant improvement in a series of testing of cardiovascular fitness performance.

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Relevant to the data that has been analyzed, the result in table 4.7 shows, throughout the four months of training periods, it is suggested there is also a significant improvement in the cardiovascular fitness performance of the players. In comparison, the level completed in YYIR1 for Test 1 was 68.65 ± 3.88 $ml \cdot kg^{-1} \cdot min^{-1}$ whereas the result in Test 6 was 75.40 ± 5.45 $ml \cdot kg^{-1} \cdot min^{-1}$. The number of levels completed in the post-test or Test 6 shows an increment and it means the players able to run and covered more distance and level in 20m distance according to the sound recorded.

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Table 4.7

Cardiovascular Fitness Performance based on Repeated Measures

Variables	Mean Difference	Std. Error
Y1-Y2	-3.91	0.01
Y1-Y3	-5.96	0.02
Y1-Y4	-6.74	0.02
Y1-Y5	-6.74	0.02
Y1-Y6	-6.74	0.02
Y2-Y3	-2.05	0.01
Y2-Y4	-2.83	0.01
Y2-Y5	-2.83	0.01
Y2-Y6	-2.83	0.01
Y3-Y4	-0.78	0.00
Y3-Y5	-0.78	0.00
Y3-Y6	-0.78	0.00
Y4-Y5	0.00	0.00
Y4-Y6	0.00	0.00
Y5-Y6	0.00	0.00

Significant is set at 0.05 level.

Y=YYIR1 ($ml \cdot kg^{-1} \cdot min^{-1}$)

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4.4 Summary

All of the findings in this study were recorded during an actual session of the player's performance monitoring process. All of the players have gone through a six series of fitness testing during in-season performance monitoring. This player's performance monitoring process, which included the testing battery and the periods of the monitoring process, was decided by the head coach and advised by the physical conditioning coach of the club. There were no specific rules and regulation of fitness testing battery or periods has been stated by the Football Association of Malaysia or club, but, most of the soccer club in the Malaysian league will conduct their own player's performance monitoring by the head coach and physical conditioning coach consensus.

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CHAPTER 5

DISCUSSION AND RECOMMENDATION

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5.1 Introduction

The focus point in this study was to examine the relationship between sprinting performance, cardiovascular fitness performance, and sRPE on professional soccer players during in-season player's performance monitoring. The players' performance monitoring process is one of the important factors that should be taken into a coach's consideration in drawing out their training program for a season. Throughout the process of monitoring, the player's performance can be identified and the training program can be manipulated to enhance the player's performance towards maximum potential. It was proven that with high intensity running training for football players within eight to twelve weeks will enhance 5 % to 11% of maximum oxygen consumption, increase in running economy, lower down blood lactate accumulation in

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submaximal exercise and improve 13% of yoyo intermittent recovery test (Iaia, Rampinini, & Bangsbo, 2009).

Other than that, the relationship of one variable with another variable in enhancing performance will provide an extra advantage for the coaches in preparing their training program. By improving one variable, at the same time, it will affect another variable. In a previous study, it shows, in a series of repeated-sprint ability, the subject with a greater maximal aerobic can sustain or maintain a level of speed and have a better recovery (Thébault, Léger, & Passelergue, 2011). Hence, the actual relationship in any selected variables needs to be confirmed by a proper study and documentation.

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5.2 Discussion

In line with the purpose of the study, the raw data was collected in actual in-season player's performance monitoring process throughout four months of the league.
Thirty participants for this study were professional soccer players who were involved directly in a professional soccer league in Malaysia. The frequency of training. training intensity, type of training, and duration of training in every single session was properly implemented and monitored. The training program for the whole season was well design by the head coach of the club including technically, tactically, physically, and psychologically aspect.

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Furthermore, when it comes to a comprehensive preparation for professional soccer players, every detail and prospect needs to be taken into consideration. There was a significant difference in speed and agility performance between amateur soccer players and professional soccer players. Professional soccer players have better speed and agility performance rather than amateur soccer players (Kaplan, Erkmen, & Taskin, 2009).

Besides that, a deep focus also needs to be considered in preparing professional soccer players according to their playing position. Each player plays an important and specific role in their position playing. The individual drills and needs of training are supposed to be planned and implemented in a training session. In the example, a left and right flank players have to possess an ability to speed in a straight line and curvilinear for attack and defend throughout the match. Additionally, that, wide backs and central backs players also possess a different high-intensity activity whereas 58% of intense activity performed by the players in a match is a high-intensity burst that less than three seconds (Clark, 2010). Thus, it is recommended, to develop power, speed, and strength related fitness more efficiently, proper consideration needs to take a count on training volume and training type throughout the season (Lesinski, Prieske, Helm, & Granacher, 2017).

Player's performance monitoring also one of the important areas that need to look into to confirm the outcome of the training program implemented. Any training drill can be conducted on the field but the effectiveness of it in achieving the training objective is only can be determined by fitness testing. The coaches can not rely on the

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pre-plan fitness testing monitoring program only, the increment or decrement on player's performance should also be monitored as a daily and session basis.

5.2.1 Discussion on the Relationship between Sprint Time, Cardiovascular Fitness Performance and sRPE

The ability to acquire a high aerobic capacity will be a significant advantage for a soccer player as a main and important role to maintain the intensity level which is also characterized as short burst activities during a soccer match is the aerobic system capabilities (Meckel, 2009). The relationship between sprint time, cardiovascular fitness performance, and sRPE have been investigated and the result from the analysis shown there was no significant relationship between sprint time performance and sRPE whereas there was also no significant relationship between cardiovascular fitness performance and sRPE. It is contradicted with the study conducted by (Campos-Vazquez, Toscano-Bendala, Mora-Ferrera, & Suarez-Arrones, 2017), in pre-test and post-test of 30-15 intermittent fitness test conducted on professional soccer players, it showed a positive and large correlation between practice volume, sRPE – training load, and the sum of RPE with the improvement on intermittent performance but no relationship found in heart rate measurement. In this study, the variables were not interrelated and influence each other.

The sRPE data in this study were collected in every training session and fitness testing session, the sRPE in that specific session was supposed to reflect the internal training load intensity gone through by the players throughout the training or

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testing session. However, the results show no significant relationship between all of these variables and the result also does not show reflection or positive relation on the level of running completed in YYIR1 and time scored in 20m sprint with the internal load intensity express by the players. It is not supported that higher numbers of level or interval running completed and shortest time score in 20m sprint reflect the higher sRPE expressed. There were some of the participant's score a high value in 20m sprint and YYIR1 but express a low value in sRPE. This condition can be explained as the participants possess a high recovery rate. On the other hand, some other participants score a low value in 20m sprint and YYIR1 but express a high value in sRPE may because of low in recovery rate capacity or ability.

Based on the result of this study, to further discuss it, two main factors have been pointed out, which is the muscle strength of the players and the recovery rate of the player. According to Orange & Smith (2016), elite soccer nature represents a dynamic, complex, and unpredictable pattern with high-intensity action. Besides that, within ninety minutes of the match, elite soccer players will complete almost three thousand actions including jumping, sprinting, turning, accelerating and decelerating, they will also cover ten to twelve kilometer of walking or jogging.

Hence, for an individual to sustain and pushing towards a maximum cardiovascular fitness ability, the muscular strength and muscular endurance of the lower limb will also play an important role that will affect the result. In line with the development of cardiovascular fitness, a strength and power training program also

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need to be prescribed and implemented to ensure full-strength and power is well developed parallel with cardiovascular fitness performance (Orange & Smith, 2016).

An individual might be able to push their heart to supply efficient oxygen for the working muscle, but their lower limb muscles do not possess muscular strength and muscular endurance to ensure the sustainability or prolonged the running. This may reflect the result on the 20m sprint, YYIR1, and the sRPE value. This kind of individual can turn out into two conditions, result in a low value of YYIR1 and low value of sRPE or result in a low value of YYIR1 and high value of sRPE. This is because, the sRPE was the internal training load or intensity reflected by the players on the stimulus given, if the individual prone to fatigue on the lower limb caused by the lack of strength and endurance, the sRPE value will be higher. On the other hand, if this individual was giving up at the early stage of the muscle fatigue, the sRPE value expressed might be below, as this individual not pushing towards the maximal ability of his strength. This statement supported by (Bieuzen, Vercruyssen, Hausswirth, & Brisswalter, 2007), as in their findings shows, during submaximal cycling, there were significant relationships between the neuromuscular optimum pace with strength capacities of the trained cyclist.

Different individuals will have a different recovery rate either from vigorous high-intensity activity or continuous low and average intensity activity. The rate of recovery of each individual depends on the fitness level, adaptability towards training stimulus, an acute physiological response, and current wellness statuses such as sleeping pattern, any illness, and nutrition intake before or during activity. All of these

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factors will affect the recovery rate of an individual. The previous study conducted by (Hansen et al., 2006) indicates that cardiovascular fitness is one of the important factors that help soccer players to recover from repeated sprint demanding activities.

The sRPE was collected 20 minutes after the participants finish or stop the fitness test. In a perspective of physiological adaptation and response, once the individual reaches towards maximal efforts in a particular activity, they need high demands in energy supply, consistent and maximize muscle working capacity and therefore it put high pressure on the cardiovascular system, respiratory system, and other physiological related changes and these result in exhaustion. That was why the sRPE need to be collected 20 minutes after the participants eliminated or stop the test. It was to ensure the participants expressed the actual intensity internally on the whole session conducted and not only reflected the single drill or single testing conducted. As mention earlier, the recovery rate also played an important role in expressing the internal training load or intensity received by the participants. In a study conducted by (Tomlin & Wenger, 2001) suggested that aerobic fitness can enhance the recovery rate of an individual from a high-intensity intermittent activity.

5.2.2 Discussion on the Relationship between 20m Sprint Performance and Cardiovascular Fitness Performance

Based on the analysis, the result in table 4.6 showed a significant relationship between 20m sprint performance and cardiovascular fitness performance. A positive relationship between both of these variables indicates that players who score better

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time in 20m sprint have a better score in YYIR1. On the other hand, players with high time in 20m sprint scored less value in YYIR1.

In a study conducted by (Nikolaidis, Dellal, Torres-Luque, & Ingebrigtsen, 2015), they found a correlation between 20m sprint time and repeated sprint ability performance. A player that performs a better score in repeated sprint ability performed better in 20m sprint. These findings support that the players' cardiovascular fitness ability reflects on the sprinting performance. A player's fitness ability needs to be at the highest level to make sure they can complete the sprinting in the shortest time.

Besides that, the lower limb strength and power also tend to influence the sprinting time. A performance shown in 20m sprint time was correlated with the muscle strength and power of the lower limbs (Nikolaidis et al., 2016). In another study conducted, it shows the high-intensity action and acceleration and deceleration markers of the players start to reduce in the last fifteen minutes of match play (Russell et al., 2016). It is suggested, the muscle strength and power of the players start to reduce in the last minute throughout the match play and it is due to muscle fatigue. Therefore, a sport-specific training drill needs to be well planned and implemented on the field in preparing players to perform at maximum ability on a match day.

It was suggested that plyometric and explosive strength training should be integrated into normal soccer training to maximize a kicking velocity potential. It showed, strength and power on lower limbs of soccer players were not only crucial on

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a sprinting action, but it will also enhance the kicking velocity for the player (Rodríguez-Lorenzo, Fernandez-Del-Olmo, & Acero, 2016). On the other hand, it was proven that accurate and efficient strength training resulted in improving performance and reduce the risk of injuries (Zouita et al., 2016).

According to (Sanders et al., 2017), soccer players with high aerobic fitness ability performed faster sprinting time in repeated sprint ability test with a distance less than 40 meters. It is not only proven in a study on soccer players, in a study conducted for volleyball players also showed, but the repeated sprint ability training drill can also improve on aerobic capacity and anaerobic performance of the players (Kaynak, Korkmaz Eryılmaz, Aydoğan, & Mihailov, 2017).

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5.3 Summary

Based on the findings from the study, it shows no significant relationship between sprint time and sRPE and also no significant relationship between cardiovascular fitness performance and sRPE on PKNP FC professional soccer players during in-season's performance monitoring. However, the outcome shows a significant relationship between sprint time performance and cardiovascular fitness performance.

Throughout the study, the participants which are the PKNP FC professional soccer players undergone an actual training program as per plan by the head coach of the team. There were no treatments given on the participants in this study. The data

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was collected on the actual performance monitoring program of the team. The head coach of the team already set a program for the team and one of it including a performance monitoring program during in-season. If refers to the daily training program attached, all participants have gone through a continuous training session with a considered recovery session in between. The speed-endurance training (SET) either speed-endurance production or speed-endurance maintenance implemented on the players provides a great improvement on the sprint ability and aerobic capacity of the participants. Besides that, speed training conducted also provides an influence on the improvement of sprinting time. Speed-endurance capacity known as match specific demands in soccer and related training program implemented on the participants shows an improvement towards the ability of the participants to perform better in a match environment, training session, and testing session.

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The player's performance monitoring for this team is based on the fitness testing which is conducted monthly. Every fitness testing conducted involved 20m sprinting in a straight line and a cardiovascular fitness test which is YYIR1. The testing was done on an actual grass training ground of the team. All players wear proper training attire and the same boot that they use in a daily training session or on a match day.

In a soccer nature, players are required to perform a high-intensity speedrunning, repeated short burst, keep on changing direction, jumping for ball challenge, consistency of dribbling and running with the ball, strong body contact with the opponent including shielding the ball, split-second acceleration, and

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deceleration, wavy or curvilinear running and most important part can sustain to play for 90 minutes of the match. All of these factors only can be performed with a high ability of physical conditioning level. A holistic physical conditioning preparation needs to be considered to push the players towards a maximum and beyond their ability. Refers to the training program attached, all participants also undergone specific strength and power training included functional strength training in a series of circuit training drills and programs. Functional strength training in circuit training session enhanced participant's ability to perform a soccer-specific movement which included a various immediate changing of direction, unstable foot landing capability, suddenly accelerate and decelerate with imbalanced body posture, and a lot more soccer-specific motor skill. If refers to the training program attached, most of the training drill was embedded with the soccer-specific skill, technique, and ability, and this also influences in improving participant's physical conditioning status.

Besides proper training drills that mimic a sports specific demand, the manipulation on the principle of training is important to ensure the super-compensation on the players is happen. The element frequency of training, the training intensity, training time, and type of training need to closely monitor. This element which is embedded with the principle of training maximized the player's potential. Training stimulus given on the players needs to consider the physical conditioning status of the players. If not, it impaired the player`s adaptability and positive progression in the training program. Recovery is a part of the training, hence, the principle of recovery also needs to consider in preparing a training program on the player. However, there a certain period that we need to purposely overload the player

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to make sure they are pushing themselves beyond their comfort zone and to avoid a plateau in performance. The training program attached shows a proper recovery session provided on participants and this support that all participants achieve proper recovery time and super-compensation objective was achieved. Improvement in every month's testing session also supports that all participants underwent a relevant recovery session and training program.

Always bear in mind, too much rest and very low in intensity applied in a training lead to reversibility on players. They start to lose what they possess once the stimulus put on them is lower. Because of that, a performance monitoring program is really important to identify the player's physical conditioning status. From the data acquired, coaches have a better view of the current condition of the player, and easier for them to layout a next suitable training program. Without data on the player, it leads towards a wrong perception and further path in preparing a training program.

Other than that, an individual focus and drill also need to be conducted on a certain player that may not achieve a team average physical conditioning status. The principle of individualization explains that a different individual has a different requirement on training approach and different adaptation on training stimulus. A different individual may require a different weight loading in strength training, a different approach to aerobic capacity training, different recovery rate, and differences in individual running techniques or biomechanics.

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A very practical way to identify the physical conditioning status of the players is through conducting a specific and sports-related fitness testing on the player. A 20m sprint shows the sprinting ability and at the same time determined the lower limb strength and power to exert a maximal force in the shortest time. YYIR1 is a well-developed protocol specific to intermittent sports nature such as soccer and rugby. It is used to determine the maximum aerobic capacity of the players. Both of these tests are interrelated with each other and it is proven through a significant relationship in this study. Players that can run faster in 20m sprint able to perform better in YYIR1. If the players only possess an aerobic fitness without a lower limb strength and power, he not able to maintain or sustain repeated running bouts.

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5.4 Recommendation

The findings in this study show a significant relationship between 20m sprint and cardiovascular fitness performance, but it shows no significant relationship between 20m sprint and sRPE and cardiovascular fitness performance with sRPE. Hence, it is suggested, further study needs to be conducted to pursue a relevant understanding of the sRPE, 20m sprint, and cardiovascular fitness performance. In this study, the sRPE was recorded 20 minutes after the finish of the testing session, so in the future, the design of the testing battery can be altered to test only one variable in a single testing session. The testing battery can be design as an isolated testing session which is only 20m sprinting time is tested at one session and only the YYIR1 test will be conducted on another testing session. Hence, the isolated relationship between sRPE and 20m

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sprint can be examined and on the other hand, the relationship between YYIR1 performance and sRPE also can be examined. On the other side, to further the study on sprint time, cardiovascular fitness performance, and sRPE, maybe another variable such as heart rate or metabolic analyzer can be monitored and the data can be analyzed for the relationship of the variables.

Even this study is focused on the professional soccer players, however, the findings still can be used and implemented in a various or multi-level of population. Started from a student in a primary or secondary school, university students, and athletes, and expand to a whole society in Malaysia. The important part is, this study was purely conducted on a team that actively competing in a Malaysian soccer league. Hopefully, the outcome from this study can be a reference for local coaches in a Malaysian soccer league in addition to their knowledge.

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APPENDICES

APPENDIX A

Appendix A Protocol and Procedures

Protocol/Procedures	Notes
Preliminary assessments	Participants fill up and sign informed consent. Check on participants' health status or any related injury.
Height and weight measurement	All the measurement was recorded before the test begin.
Warm-up protocol	10 minutes of dynamic stretching.
20-meter sprint test	All participants start with standing start.
Yoyo Intermittent Recovery Test Level 1 (YYIR1)	Given one time warning and eliminated from the test if cannot reach the start and finish line before the beep sound.
Session's Rate of Perceived Exertion (sRPE)	Recorded 20 minutes after YYIR1
Cooling down	Passive stretching.

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APPENDIX B

Appendix B Weight & height scale (Kyoto, Japan)



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APPENDIX C

Appendix C 50m tape measurement

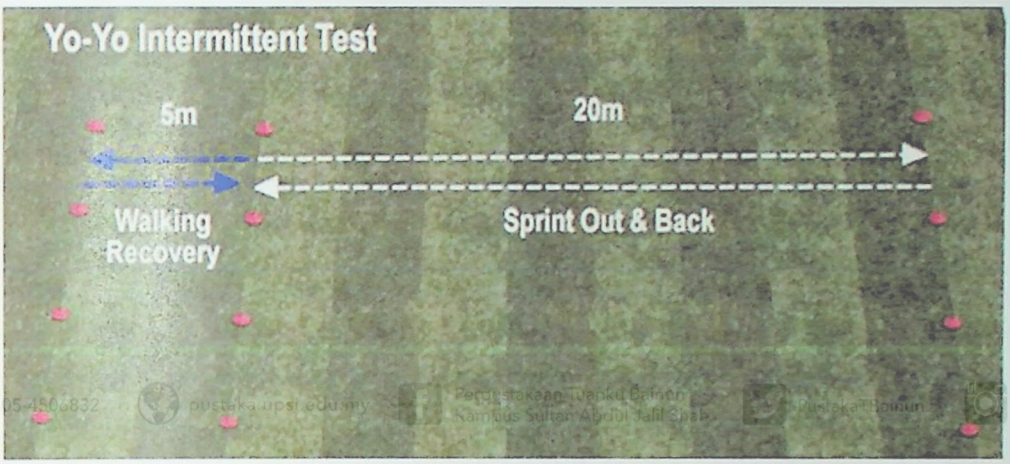


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APPENDIX D

Appendix D Yoyo Intermittent Recovery Level 1 Test Diagram

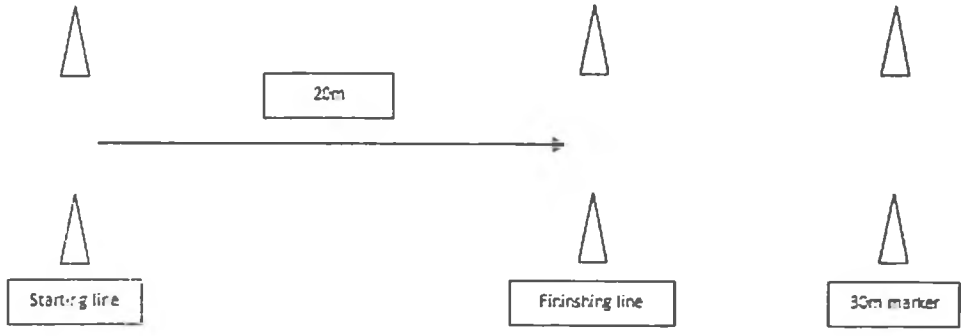


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APPENDIX E

Appendix E 20m Sprint Test Diagram



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APPENDIX F

Appendix F PKNP FC training session





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APPENDIX G

Appendix G RPE Scale

RPE Scale (Rate of Perceived Exertion)	
1	**Very Light Activity** (anything other than complete rest)
2-3	**Light activity** (feels like you can maintain for hours, easy to breath and carry on a conversation)
4-5	**Moderate Activity** (feel like you can exercise for long periods of time, able to talk and hold short conversations)
6-7	**Vigorous Activity** (on the verge of becoming uncomfortable, short of breath, can speak a sentence)
8-9	**Very Hard Activity** (difficult to maintain exercise intensity, hard to speak more than a single word)
10	**Max Effort** (feels impossible to continue, completely out of breath, unable to talk)

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APPENDIX H

Appendix H Yoyo Intermittent Recovery Level 1 Testing Session





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APPENDIX I

Appendix I Inform Consent

THE RELATIONSHIP OF SPRINT TIME, CARDIOVASCULAR FITNESS AND SESSION'S sRPE ON PKNP FC PROFESSIONAL SOCCER PLAYERS DURING IN-SEASON'S PERFORMANCE MONITORING

Dear respondents,

This is an academic research. The main purpose of this study is to investigate the relationship between sprint time, cardiovascular fitness and session's rate of perceived exertion (sRPE) on the PKNP FC professional soccer players during an in-season performance monitoring program or fitness test program.

This study will be conducted on 30 participants from the PKNP FC professional soccer players during an in-season performance monitoring program.

Throughout this study, the participants possibly experience the physiological and psychological stress.

Hereby,

I..... IC no .....agree to participate in this study which is will be conducted as part of my performance monitoring program or fitness test program. All the possibility or accidentally that was happen is in my responsibility and will not take any action if any bad accident happens during the study and test. Here, I'm willing to become a subject.

Signature,

.....

( )

Thank you for your cooperation.

Researcher:

Name NOR IKHMAR BIN MADARSA
IC & student Number 881004-02-5161 & M20142002273
Faculty of Sports Science & Coaching, Universiti Pendidikan Sultan Idris (UPSI)

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APPENDIX J

Appendix J Yoyo Intermittent Recovery Level 1 Test Protocol

The Yo-Yo Intermittent Recovery Test Level 1 is one of six official versions of the yo-yo test and is the most commonly used version. You might find it also referred to as theYYIR1, YYIRL1 or just the Yo-Yo test. There is also a Level 2 Yo-Yo Intermittent Recovery Test. The level 1 test was originally designed for recreational level athletes, while the level 2 test was designed for highly-trained athletes, though most sports tend to use the level one test for athletes of all fitness levels. You can read the general procedure for conducting the yo-yo test, below are details specific to this version.

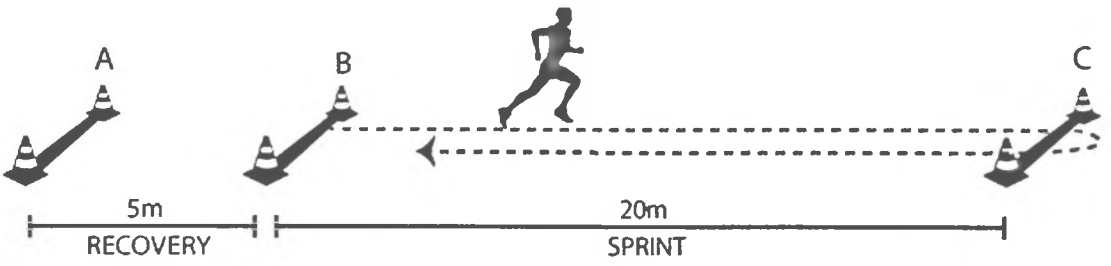
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Equipment Required: flat non-slip surface, marking cones, measuring tape, cd or mp3 player with good speakers, audio file or cd, recording sheets. See more details about the required Yo-Yo Test Equipment.

Course layout: Cones or tape is used to mark out three parallel lines, 5 and 20 meters apart, as shown in the diagram.

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Yo-Yo Intermittent Recovery Test

The Yo-Yo Intermittent Recovery Test Layout

Preparations: Make sure the participants are adequately prepared: well-rested, hydrated and fueled, and familiar with the test procedure and motivated to perform maximally. Give clear and standardized instructions about the test and what is expected of them including the importance of keeping in time to the recording and completing the full 20m run.

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Starting the Test: All participants should line up along the starting line. The athletes start with a foot behind the middle line (cone B) and begin running when instructed by the audio recording. The athlete turns when signaled by the recorded audio beep (at cone C), and returns to the starting point. The athlete must not start running early, must run the complete distance, and reach each line before or in time with the recording.

During the test: There is an active recovery period of 10 seconds between every 40 meters run, during which the subject must walk or jog to the next line (cone A) and return to the starting point. At regular intervals, the running speed increased. The starting speed for the Level 1 Intermittent Recovery Test is 10.0km/hr, and increases

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to 12km/hr, 13km/hr, and then increasing by 0.5 km/hr thereafter. For more details see the table of speeds and distances for the YYIR1.

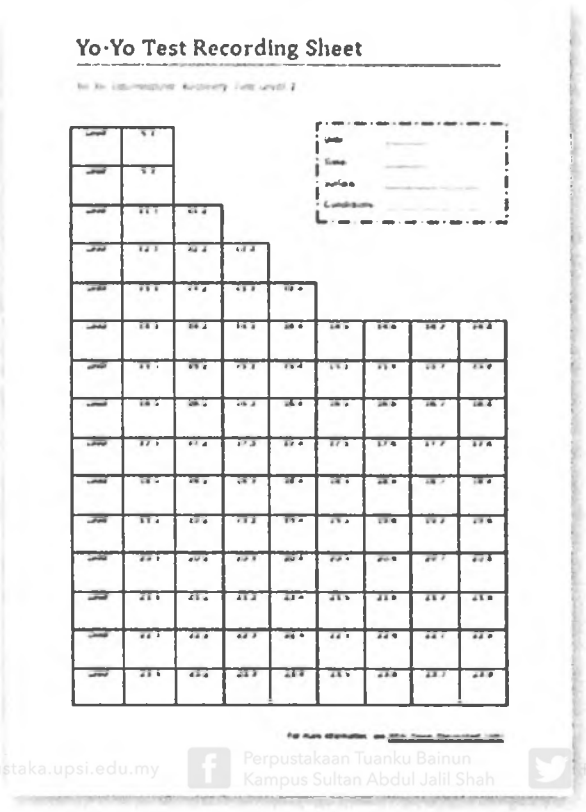
Finishing the test: The participants must continue for as long as they can. Some of the athletes will choose to stop when they have reached their physical limits. For others, you will need to give a warning as they drop behind the required pace or make one of the errors listed below. On the second infraction, you pull them out of the test. You give a warning when the participant:

- It does not come to a complete stop before starting the next 40m run.
- It starts the run before the audio signal.
- It does not reach either line before the audio signal.
- Turns at the 20m mark without touching or going over the line (therefore running short).

Scoring: The participant's score is the level or total distance covered in the last complete successful shuttle. Use the YYIR1 scoring sheet to keep track of athlete scores.

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Yo-Yo Test Recording Sheet

YYIR1 scoring sheet

Interpretation: You can use the YYIR1 table of norms to work out a fitness rating based on the score. There has been a formula published for estimating VO_2max (ml/min/kg) from the Yo-Yo IR1 results, you can use this YYIR1 calculator to work out VO_2max and get a fitness rating.

(Wood, 2008)

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APPENDIX K

Appendix K PKNP FC Training Program

WEEK/DAY	TRAINING DESCRIPTION		REMARKS
	SESSION 1 (Morning)	SESSION 2 (Afternoon)	
WEEK 1 Day 1	**Morning walk, easy running – 20min** **KAKU – 20min** -5v2 (free touch) #12yrd x 12yrd **11v11 – 7min** #score push up mid 3rd	**Physical assessment – 30min** -weight & height **Dynamic warm up & stretch – 10min** ***(Dynamic 1)*** -jog -sideways running -zigzag running -backward shuffle -carioca -half high knee -scissors -kick butt -hip in -hip out -abductors -adductors -front kick -back kick -side volley -groin stretch -squat & calf raise -forward lunges -side lunges -jump heading -backward heading -body check **Fitness testing – 1hour 30min** -YYIR1 & 20m sprint	
Day 2	**Dynamic 1 – 10min** **Gym session – 1hour 30min** ***(Gym 1)*** -gym ball plank -alternate elbow to knee -russian twist -alternate push up on ball -hip bridge -crunches -squat -hip thrust	**Fun game – 30min** *Keep ball possession & scoring -front volley -inside foot -heading #2team (1team=11players) #half field **SAQ – 10min** ***(SAQ 1)*** -high knee, left side high knee, right side high knee -pole zigzag	

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	-back extension -push up -bicycle abs #11station (1station=2players) #20sec:20sec x 4set #muscular endurance	-run over hurdles -striding 10m -short burst 10m #2groups #6set **Passing drill – 20min** ***(Passing 1)*** -1 touch, 10m -2 touch, 10m, 20m -side volley -front volley -inside foot -tight control, pass -chest control, pass -heading, drive ball #2players=1ball **Pressurize–25min** -condition play -1 touch, 2 touch, free touch #9v9 #quarter field #7min:1min x 3set **SSG – 30min** -condition play -free touch, grounder -2 touch -free touch -1 touch #4v4+GK #double penalty box #4group **Core exercise + cooling down – 15min** ***(Core 1)*** -crunches -push up #20sec:20sec x 3set	
Day 3	Rest	**Morning walk, Mini band activation – 10min** ***(Mini band 1)*** -abductor -adductor -front kick -back kick -hip in -hip out -squat & calf raise #static #10reps each exercise, both leg **Easy running – 10min** **Dynamic warm up & body check – 10min** ***(Dynamic 2)***	

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		-active stretch, sideways, zigzag -high knee, side high knee -short shuttle #marker -run over, side high knee, zigzag -double hop, single leg hop -fwd bwd, check in check out #hurdles **KAKU & SET Production – 45min** -kaku 4v2, free touch, under control (7min) -sideline to sideline, comeback (30sec:30sec x 7min) -kaku 4v2, free touch, under control (7min) -sideline to sideline, comeback with ball (30sec:30sec x 7min) -kaku 4v2, free touch, under control (7min) -sideline to sideline (15sec:15sec x 7min) #15yrd x 15yrd **SSG – 25min** -6v6 + 2crosser (inside keep grounder, free touch) -6v6 + 2crosser (free touch) -8v8 (2touch) -8v8 (free touch) #half field with GK **Core exercise + cooling down – 15min *(Core 2)*** -leg raise -plank -push up & rotation stretch -side plank #20sec:20sec x 3set	
Day 4	**Morning walk, Mini band activation – 10min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance running – 30min *(Endurance 1)*** #1lap x 1min x 30lap #continuous running **Core exercise + cooling down –**	Rest	

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	15min *(Core 3)* -russian twist -push up -plank -back extension #20sec:20sec x 3set		
Day 5	**Dynamic 1 – 10min** **Gym 1 – 1hour 30min**	**Mini band activation – 10min** *(Mini band 2)* -fwd walk -bwd walk -sideways -zigzag fwd -bwd shuffle -high knee #active **KAKU – 15min** -4v2 (2touch) #15yrd x 15yrd **SAQ 1 – 10min** **SET Maintenance – 30min** **1 (7min)** 10m -speed with ball & comeback 20m -speed with ball & comeback 30m -speed with ball & comeback 10m + 20m + 30m -speed with ball back to back **2 (7min)** 10m +20m -speed with ball to 10m line, back pass, speed to 20m line 20m Speed with ball to 20m line, back pass 20m + 30m -speed with ball to 20m line, back pass, speed to 30m line **3 (7min)** 20m, 2group -1player speed with ball, 1player speed without ball, take over at 20m line 30m, 2group -1player speed with ball to 30m line -1player speed without ball to 30m line #alternate **4 (7min)** 10m + 20m + 30m, 2 group -speed with ball to 10m line, back	

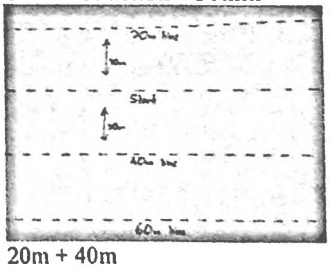
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		pass, sideways/bwd/def running to 20m line, speed to 30m line **Ball possession & pressurize – 20min** -7v7 #3team #half field #free touch 10min #2touch 10min **Ball possession, Crossing & Finishing – 20min** -4v2, cross & finish #after 5 passes, direct to LW/RW for crossing #speed for finishing **SSG – 20min** -7v7 + GK + wall #3team #double penalty area #free touch 3min x 3set #2touch 3min x 3set **Core 1 – 10min**	
Day 6	**Morning walk & Mini band 1 – 15min** **Injury prevention – 10min** -glute bridge -siku mari -hip thrust -back extension -plank -single leg high knee -nordic hamstring -groin exercise #20sec x 2set **Warm up passing drill – 20min** ***(Passing 2)*** -short tap -juggling free touch -front volley -inside foot -side volley -chest pass -drive ball heading -high ball heading **3player 1ball** -pass, press, one two -pass.set back, pass to feet -pass, set back, pass to space -pass, set back, chipping overhead to space -pass, set back, overlap from	Rest	

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	behind -pass, set back, turn & pass -aerial ball **Running circuit – 35min** #half field #1reps=4min #2reps=1set (with ball & without ball) #4min x 4set #divide 2groups (rest alternately) **Overlap & finishing – 30min** **2players** -set & shot -set back, beat & shot -set back, through pass, shot -set back, through ball to side, cut in/cut back **3players** --set & shot -set back, beat & shot -set back, through pass, shot -set back, through ball to side, cut in/cut back -set back, through ball to side, cross in -aerial ball, cross in **Core 2 – 10min**		
Day 7	**Rest**	**Morning walk & mini band activation – 15min *(Mini band 3)*** -all angle, 5reps each -open up (20sec x 3set) -fwd bwd (20sec x 3set) -juggling free touch with band -short tap with band **KAKU – 20min** -6v3 free touch #20yrd x 20yrd **SET Production – 30min**  20m + 40m -speed to 20m line, turn speed to 40m line -recovery walk 20m	

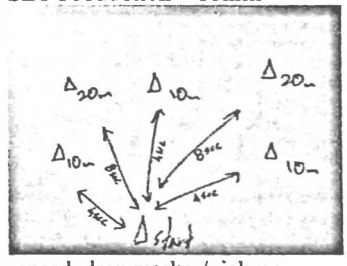
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		#12sec:12sec x 7min  40m + 60m -speed to 40m line, turn, speed to 60m line -recovery walk 20m #24sec:24sec x 7min Repeat KAKU as active recovery for 3min Repeat SET production, total 2set **Individual defending – 30min** -1v1 -2v2 -3v3 #double penalty area **Shot stop, Crossing & Finishing – 15min** -partner, 1 pass to setter, set & shot, comeback to opposite goal post to receive crossing & finish -from goal post, set shot ball at centre of the grid, take shot #double penalty area **Ball Possession & finishing – 30min** -5v5 + 2GK + 2players(wall), (1touch) -7v7 + 2GK (2touch) #double penalty area #losing team, extra speed work in area of play **Core 3 – 10min**	
WEEK 2 Day 1	**Passing 1 – 15min** **SAQ – 15min** ***(SAQ 2)*** -quick feet, pole on ground (side & fwd bwd) -high knee, side high knee (ladder) -zig zag (slalom pole) -short shuttle #2group #6set	**Recovery session – 45min** -tabata (8exercise) -PNF stretching -pool #swimming pool	

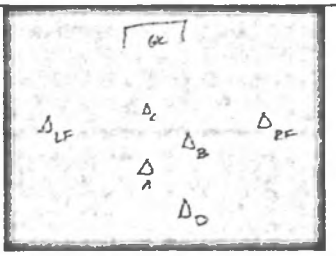
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	Ball possession – 20min -6v6 (1touch, 2touch, free touch) #quarter field #3team **Ball Possession & finishing – 30min** -5v5 + 2GK + 2players(wall), (1touch) -7v7 + 2GK (2touch) #double penalty area #losing team, extra speed work in area of play **Core 3 – 10min**		
Day 2	**Rest**	**Friendly match – 90min** #30min x 3set #rotate player	
Day 3	**Dynamic 1 – 10min** **Yoyo Nike Version – 30min** -stage 18 = 6min:6min x 3set **Core exercise – 20min** *(Core 4)* -push up -back extension -plank to push up -push up & stretch -leg raise -siku mari -bicycle -crunches #10reps x 3set	**Easy running – 10min** **Dynamic 1 – 5min** **Passing 1 – 15min** **Fun game** -tennis football #6v6 **SET Production – 10min**  -speed, drop marker/pick up marker, speed back -5pole -10mx3pole, 1pole=4sec -20mx2pole, 1pole=8sec #total=28sec(30sec) #30sec:1min x 3set **Finishing – 45min**	

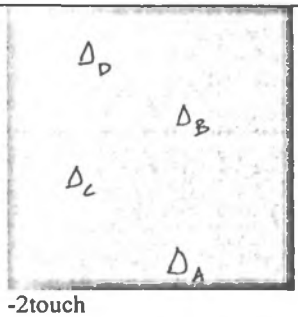
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		 -A-B-C, C set back to B, B-LF, cross in -D-A-B, B set back to A, A-RF, cross in -A-C, C turn & shot -A-C, C set back to A, A through pass to C, shot -D-B-A-C, C set back to A, A through pass to C, shot **Core 1 – 10min**	
Day 4	**Rest**	**Mini band 1 – 10min** **Gym session – 2 hours** ***(Gym 2)*** -squat -plate shoulder press -leg extension -leg curl -rowing -tricep extension -leg press -calf raise -chest press -push up -dumbell deadlift on balancing mat -barbell bicep curl -lateral raise -adductor on chair -bench jump over & high knee/side high knee/zigzag -fit ball adductor squeeze -plank #12reps x 3set **Hill running – 45min** #20yrd drill – 20yrd striding – 20yrd sprint #20reps	
Day 5	**Morning walk – 5min** **Mini band 1 – 10min** **Dynamic warm up & Passing drill – 20min** ***(Passing 3)***	**KAKU – 30min** -4v2 #free touch, 2touch, free touch under control #15yrd x 15yrd	

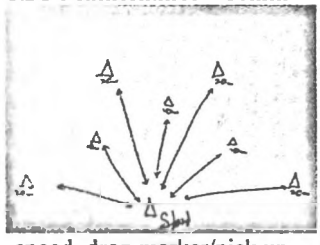
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-2touch
-1touch
-one two
#A-B-C-D-A

SET Maintenance – 10min



-speed, drop marker/pick up marker, speed back
-7pole
-10mx3pole, 1pole=4sec
-20mx4pole, 1pole=8sec
#total=44sec(45sec)
#45sec:90sec x 3set

Defending & Attacking – 60min
#divide two group, alternate in 30min

Defending – Organizing back 4
-opponent keep ball possession, try to pass to striker
-back 4 drill on covering, marking, close press, shifting
-high ball striker, back 4 clear & push up

Attacking – Finishing, 10ball x 3set

Combination defender & midfield in attack – 30min
-7v5
-9v6
#full field

Core 2 – 10min

Dynamic 1 – 5min

Ball possession – 30min
-7v7
-free touch, 2touch, 1touch
-quick release, passing option & show
-short-short-away
#30yrd x 55yrd
#60yrd x 55yrd (progress)

Shadow play & build up attack – 60min
-8v6 + 4v1
-build up from GK, 8v6
-keep possession half field
-create chances to att after half line, play to striker
-only 3players support striker, 4v1

Core 3 – 10min

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Day 6	**Rest**	**Friendly match – 90min** #30min x 3set #rotate player	
Day 7	**Morning walk, Mini band activation – 10min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance running – 30min** *(Endurance 2)* #1lap x 1min x 12lap #1lap x 55sec x 12lap #1lap x50sec x 12lap #rest 2min between set **Core 1 – 10min**	**Rest**	
WEEK 3 Day 1	**Mini band 1 – 10min** **Gym 2 – 2 hours** #12reps x 3set **Hill 1 – 45min** #20reps	**Rest**	
Day 2	**Dynamic 2 – 10min** **Running circuit – 25min** -full field -4reps with ball -4reps without ball #2groups, rest alternately #3min:3min x 8reps **Core 2 – 10min**	**Mini band activation, free – 10min** **KAKU – 15min** -6v2 #20yrd x 20yrd **Pressurizing – 30min** -9v4, 9v6 -keep ball possession -pressure to win ball & change side #30yrd x 30yrd x 2box **Ball possession – 30min** -8v8v8 -score after line #half field, sideline is scoring line **SSG – 30min** -8v8 + GK #half field #losing team extra	

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		Core 3 -10min	
Day 3	**Mini band 2 – 5min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance running – 30min** ***(Endurance 2)*** #1lap x 1min x 12lap #1lap x 55sec x 12lap #1lap x50sec x 12lap #rest 2min between set **Core 1 – 10min**	**Recovery session – 45min** -tabata (8exercise) -PNF stretching -pool #swimming pool	
Day 4	**Mini band activation, free – 10min** **Passing 1 – 20min** **YYIR1 fitness drill – 30min** -level 18.1 x 3set **Defending – 20min** -1v1, 2v2, 3v3, 4v4 #half field **Finishing – 20min** -2players, 3players -overlap passing #full field	**Mini band 2 – 10min** **Dynamic 2 – 10min** **Resistance sprint – 30min** -10m, 20m, 30m, 40m, 60m x 2set **40m sprint – 5min** -<6sec x 4set **SSG – 15min** -4v4 -3team -5min x 3set -losing team, extra #3quarter field	
Day 5	**Mini band 1 – 10min** **Gym 2 – 2 hours** -explosive #6reps x 3set **Hill 1 – 45min** #20reps	**Passing 2 – 10min** **Passing 3 – 10min** **SET Production – 30min** -sideline to sideline,comeback #25sec:25sec x 7min -sideline to sideline #12sec:30sec x 7min -sideline,halfline,comeback sideline, sideline, comeback #25sec:50sec x 7min **Organizing 11v11 – 20min**	
Day 6	**Rest**	**Friendly match** #90min	
Day 7	**Rest**	**Rest**	

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WEEK 4 Day 1	**Dynamic 1 – 10min** **KAKU – 30min** -7v2, 20yrd x 20yrd **Ball possession – 30min** -2group -3 quarter field **Organizing in defend & attack – 30min** -full field -6v6, 8v6, 10v8, 11v11 **Finishing** -all players	**Physical assessment – 30min** -weight & height **Dynamic 1 – 10min** **Fitness testing – 1hour 30min** -YYIR1 & 20m sprint	
Day 2	**Dynamic 2 – 10min** **Running circuit – 25min** -full field -4reps with ball -4reps without ball #2groups, rest alternately #3min:3min x 8reps **Core 2 – 10min**	**Friendly match** #90min	
Day 3	**Recovery session – 45min** -easy running 20min -PNF stretching -pool #swimming pool	**Mini band 2 – 5min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance running – 30min** ***(Endurance 2)*** #1lap x 1min x 12lap #1lap x 55sec x 12lap #1lap x50sec x 12lap #rest 2min between set **Core 1 – 10min**	
Day 4	**Mini band 1 – 10min** **Gym 2 – 2 hours** -explosive #6reps x 3set **Hill 1 – 45min** #20reps	**Mini band 2 – 10min** **Dynamic 2 – 10min** **Resistance sprint – 30min** -10m, 20m x 2set **40m sprint – 5min** -<6sec x 4set **SSG – 15min** -7v7 + GK -3team	

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		-5min x 3set - #3quarter field	
Day 5	**Rest**	**Passing 2 – 10min** **Passing 3 – 10min** **SET Production – 30min** -sideline to sideline,comeback #25sec:25sec x 7min -sideline to sideline #12sec:30sec x 7min -sideline,halfline,comeback sideline, sideline, comeback #25sec:50sec x 7min **Organizing 11v11 – 20min**	
Day 6	**Rest**	**KAKU – 30min** -4v2 #free touch, 2touch, free touch under control #15yrd x 15yrd **Dynamic 1 – 5min** **Ball possession – 30min** -7v7 -free touch, 2touch, 1touch -quick release, passing option & show -short-short-away #30yrd x 55yrd #60yrd x 55yrd (progress) **Shadow play & build up attack** -8v6 + 4v1 -build up from GK, 8v6 -keep possession half field -create chances to att after half line, play to striker -only 3players support striker, 4v1 **Core 3 – 10min**	
Day 7	**Rest**	**Rest**	
WEEK 5 Day 1	**Mini band 1 – 10min** **Gym 2 – 2 hours** #12reps x 3set **Hill 1 – 45min** #20reps	**Rest**	
Day 2	**Dynamic 2 – 10min**	**Mini band activation, free – 10min**	

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	Circuit training– 60min -ball push up -fwd hurdles jump -plank -side jump -sit & heading -single leg jump -dribble & speed wth ball -square double leg hop -resistance high knee -crunches & shoulder press wth medicine ball -fwd high knee & shuttle run -bosu ball balnce & kettle bell swing -zig zag, single leg bounce & speed #1min, 45sec, 30sec #divide two group, alternate with finishing in every set **Finishing drill – 60min** -zig zag, set, shot -pass, through ball, shot	**KAKU – 15min** -6v2 #20yrd x 20yrd **Pressurizing – 30min** -9v4, 9v6 -keep ball possession -pressure to win ball & change side #30yrd x 30yrd x 2box **Ball possession – 30min** -8v8v8 -score after line #half field, sideline is scoring line **SSG – 30min** -8v8 + GK #half field #losing team extra **Core 3 -10min**	
Day 3	**Mini band 2 – 5min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance running – 30min** ***(Endurance 2)*** #1lap x 1min x 12lap #1lap x 55sec x 12lap #1lap x50sec x 12lap #rest 2min between set **Core 1 – 10min**	**Recovery session – 45min** -PNF stretching -pool #swimming pool	
Day 4	**Mini band activation, free – 10min** **Passing 1 – 20min** **YYIR1 fitness drill – 30min** -level 19.1 x 3set **Defending – 20min** -1v1, 2v2, 3v3, 4v4 #half field **Finishing – 20min** -2players, 3players -overlap passing #full field	**Mini band 2 – 10min** **Dynamic 2 – 10min** **Resistance sprint – 30min** -10m, 20m, 30m, 40m, 60m x 2set **40m sprint – 5min** -<6sec x 4set **SSG – 60min** -4v4 -3team -5min x 3set -losing team, extra #3quarter field	

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Day 5	**Mini band 1 – 10min** **Gym 2 – 2hours 30min** -explosive #6reps x 4set **Hill 1 – 45min** #20reps	**Passing 2 – 10min** **Passing 3 – 10min** **SET Production – 30min** -sideline to sideline,comeback #25sec:25sec x 7min -sideline to sideline #12sec:30sec x 7min -sideline,halfline,comeback sideline, sideline, comeback #25sec:50sec x 7min **Ball possession – 30min** -three quarter field, half field #2touch, free touch **Organizing 11v11 – 60min** **Core 1 – 10min**	
Day 6	**Rest**	**Friendly match** #90min	
Day 7	**Rest**	**Rest**	
WEEK 6 Day 1	**Dynamic 1 – 10min** **KAKU – 30min** -7v2, 20yrd x 20yrd **Ball possession – 30min** -2group -3 quarter field **Organizing in defend & attack – 60min** -full field -6v6, 8v6, 10v8, 11v11 **Finishing – 30min** -all players	**Dynamic 2 – 10min** **Running circuit – 20min** -full field -4reps with ball -4reps without ball #2groups, rest alternately #2min:2min x 8reps **Core 2 – 10min**	
Day 2	**Rest**	**Friendly match** #90min	
Day 3	**Recovery session – 45min** -jog, stride, speed #20lap -PNF stretching -ice bath	**Mini band 2 – 5min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance running – 30min** ***(Endurance 2)*** #1lap x 1min x 12lap	

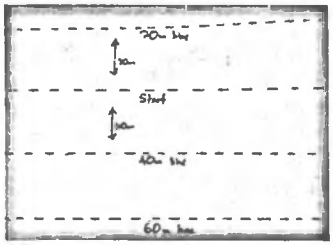
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		#1lap x 55sec x 12lap #1lap x50sec x 12lap #rest 2min between set **Core 1 – 10min**	
Day 4	**Mini band 1 – 10min** **Gym 2 – 2 hours** -explosive #6reps x 3set **Hill 1 – 45min** #20reps	**Mini band 2 – 10min** **Dynamic 2 – 10min** **Resistance sprint – 30min** -10m, 20m x 2set **40m sprint – 5min** -<6sec x 4set **SSG – 15min** -7v7 + GK -3team -5min x 3set - #3quarter field **Organizing 11v11 – 60min**	
Day 5	**Rest**	**Passing 2 – 10min** **Passing 3 – 20min** **SET Production – 30min** -centre line to back line #10sec:10sec x 7min -backline to centre line, comeback #20sec:20sec x 7min -backline to centre line to backline to centre line #30sec:60sec x 7min **Finishing – 60min** -double penalty box -set, shot -send high ball, 1st touch control, shot -cut in, cut back, crossing **Organizing 11v11 – 40min**	
Day 6	**Rest**	**KAKU – 30min** -4v2 #free touch, 2touch, free touch under control #15yrd x 15yrd **Dynamic 1 – 5min** **Ball possession – 60min** -7v7	

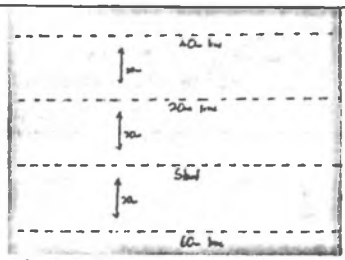
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		-free touch, 2touch, 1touch -quick release, passing option & show -short-short-away #30yrd x 55yrd #60yrd x 55yrd (progress) **Shadow play & build up attack – 60min** -8v6 + 4v1 -build up from GK, 8v6 -keep possession half field -create chances to att after half line, play to striker -only 3players support striker, 4v1 **Core 3 – 10min**	
Day 7	**Morning walk, Mini band activation – 10min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance 1 – 30min** **Core 3 – 15min** *(Core 3)*	**Rest**	
WEEK 7 Day 1	**Dynamic 1 – 10min** **KAKU – 30min** -7v2, 20yrd x 20yrd **SET Production – 30min**  20m + 40m -speed to 20m line, turn speed to 40m line -recovery walk 20m #12sec:12sec x 10min	**Dynamic 2 – 10min** **Circuit training– 60min** -ball push up -fwd hurdles jump -plank -side jump -sit & heading -single leg jump -dribble & speed wth ball -square double leg hop -resistance high knee -crunches & shoulder press wth medicine ball -fwd high knee & shuttle run -bosu ball balnce & kettle bell swing -zig zag, single leg bounce & speed #1min, 45sec, 30sec #divide two group, alternate with finishing in every set **Finishing drill – 60min** -zig zag, set, shot -pass, through ball, shot	

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	 40m + 60m -speed to 40m line, turn, speed to 60m line -recovery walk 20m #24sec:24sec x 10min Repeat KAKU as active recovery for 3min Repeat SET production, total 2set **Ball possession – 30min** -2group -3 quarter field **Organizing in defend & attack – 30min** -full field -6v6, 8v6, 10v8, 11v11 **Finishing – 30min** -all players		
Day 2	**Rest**	**Friendly match** #90min	
Day 3	**Recovery session – 45min** -jog, stride, speed #20lap -PNF stretching -ice bath	**Mini band 2 – 5min** **Dynamic 1 – 10min** **Skipping, stair step up & body check – 5min** #alternate #1min x 3set **Endurance running – 30min** ***(Endurance 3)*** #1lap x 1min x 10lap #1lap x 50sec x 10lap #1lap x45sec x 10lap #rest 2min between set **Core 1 – 10min**	
Day 4	**Mini band 1 – 10min** **Gym 2 – 2 hours** -explosive #6reps x 2set **Hill 1 – 45min**	**Mini band 2 – 10min** **Dynamic 2 – 10min** **Sprint – 30min** -10m, 20m x 6set	

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	#20reps	**40m sprint – 5min** -<6sec x 4set **SSG – 60min** -7v7 + GK -3team -20min x 3set - #3quarter field **Set pieces – 20min** -free kick, corner kick, penalty	
Day 5	**Rest**	**Passing 2 – 10min** **Passing 3 – 10min** **SET Production – 30min** -centre line to back line #10sec:10sec x 7min -backline to centre line, comeback #20sec:20sec x 7min -backline to centre line to backline to centre line #30sec:60sec x 7min **Presurrize – 60min** -half field #3team #two touch, free touch grounder, 1touch **Organizing 11v11 – 60min**	
Day 6	**Rest**	**KAKU – 30min** -4v2 #free touch, 2touch, free touch under control #15yrd x 15yrd **Dynamic 1 – 5min** **Ball possession – 30min** -7v7 -free touch, 2touch, 1touch -quick release, passing option & show -short-short-away #30yrd x 55yrd #60yrd x 55yrd (progress) **Shadow play & build up attack – 60min** -8v6 + 4v1 -build up from GK, 8v6 -keep possession half field -create chances to att after half line, play to striker -only 3players support striker, 4v1	

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		Core 3 – 10min	
Day 7	**Rest**	**Physical assessment – 30min** -weight & height **Dynamic 1 – 10min** **Fitness testing – 1hour 30min** -YYIR1 & 20m sprint	

1 Match Microcycle (Tuesday or Saturday)

DAY	TRAINING DESCRIPTION		REMARKS
	SESSION 1 (Morning)	SESSION 2 (Afternoon)	
	MATCH DAY		Tuesday /Saturday
Day -6	**Rest**	**Recovery** -easy running 20min, jog striding speed -not in the list & sub players, sparing match -massage/ice bath	Wednesday /Sunday
Day -5	**Rest**	**Rest**	Thursday /Monday
Day -4	**SET Maintenance – 30minutes** -full field -positional play -develop play & finishing -40sec:120sec x 10set **Technical Training**	**SAQ drill – 15min** -turning -short burst -short jump -quick foot -all COD **Tactical Training**	Friday /Tuesday
Day -3	**Gym training** -explosive/power -5reps x 2set -8body parts	**Short passes & finishing** **Tactical Training (Organize 11v11)**	Saturday /Wednesday
Day -2	**Rest**	**SET Production – 15min** -half field -positional play -develop play & finishing -20sec:60sec x 10set **Tactical Training (include set pieces)**	Sunday /Thursday
Day -1	**Travel** -If AWAY match, training in MORNING, travel in afternoon	**Tactical Training** -Set Pieces -11v11	Monday /Friday
D-Day	**MATCH DAY**		Tuesday /Saturday

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2 Match Microcycle (Tuesday and Saturday)

DAY	TRAINING DESCRIPTION		REMARKS
	SESSION 1 (Morning)	SESSION 2 (Afternoon)	
	MATCH DAY		Tuesday
Day -3	**Rest**	**Recovery** -easy running 20min, jog striding speed -not in the list & sub players, sparing match -massage/ice bath	Wednesday
Day -2	**Rest**	**SET Production – 10min** -half field -positional play -develop play & finishing -20sec:60sec x 5set **Tactical Training** -Set Pieces -11v11	Thursday
Day -1	**Travel** -If AWAY match, training in MORNING, travel in afternoon	**Tactical Training** -Set Pieces -11v11	Friday
D-Day	MATCHDAY		Saturday
Day -2	**Rest**	**Recovery** -easy running 20min, jog striding speed -not in the list & sub players, sparing match -massage/ice bath	Sunday
Day -1	**Travel** -If AWAY match, training in MORNING, travel in afternoon	**Tactical Training** -Set Pieces -11v11	Monday
D-Day	MATCH DAY		Tuesday

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