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Module: Exercise Physiology

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Topic: Professional football in Male Centre forward/Striker

Football is a well-liked sport all over the world, but to compete at a professional level, one must be extremely athletic and fit. Some of the most crucial players on a football team are professional in males centre forwards/strikers. Their primary responsibility is to score goals, but they also play a critical role in leading the attack and creating opportunities for their teammates (Michalak 2022). A centre striker must have great ball control abilities to receive the ball, keep it under control, and either complete the attack or set up a solid scoring opportunity. They also need good split-vision to position themselves for a finish or a scoring chance (Mitchell et al., 2020). Also, it is beneficial to have a broad repertoire of finishing methods for use with both the head and the foot since it will raise the possibility of successful goal attempts.

Central forwards/strikers need a combination of physical, technical, tactical, and psychological skills to play at the highest level (Oliveira et al., 2021). It is essential to comprehend the unique physiological needs of centre forwards/strikers to create training regimens and injury prevention measures that will improve player performance while lowering the chance of harm (Oliveira et al., 2021). Football centre forwards who are successful in the professional ranks have several essential traits. First and foremost, they need to be physically capable of running for extended periods of time, therefore an analyses and physiological testing have shown that modern football is extremely energetically demanding, and it is crucial for the players to be able to consistently put in high-intensity effort (Iaia et al., 2009). This calls for a mix of strength and power, as well as anaerobic and aerobic conditioning.

The success of centre forwards in professional football depends on training and preparation. Athletes must endeavour to improve their level of technical proficiency, physical preparedness, and tactical knowledge of the game (Keller et al., 2018). This may be accomplished via participating in games and competitions, as well as individual and team training sessions. Moreover, vital components of training and preparation include diet and recovery. For their bodies to recover properly between games, centre forwards/strikers need to eat a good diet, remain hydrated, and receive adequate rest and recovery time (Wade et al., 2014). Finally, Football players frequently sustain injuries, and centre forwards are not excluded. As a result, a key component of these athletes' training and preparation is injury

prevention. To lower the chance of injuries during practise and games, coaches and medical personnel must collaborate to establish injury prevention techniques (Impellizzeri et al., 2020). The purpose of this essay is to establish and defend a pertinent and appropriate research question on the physiological needs and demands of male's professional football centre forwards/strikers.

Football performance requires an essential element of aerobic fitness, and centre forwards are no different. Over the course of a football game, it is important to be able to execute at a high intensity while maintaining a high degree of aerobic fitness. So, to handle the physical demands of the game, football players need to be highly fit. According to research by Iaia et al., (2009) football players, 8 to 12 weeks of aerobic high-intensity running training ($>85\%$ HRmax) improves VO₂max (5%–11%), running economy (3%–7%), and blood lactate build up during submaximal exercise, as well as the yo-yo intermittent recovery (YYIR) test performance (13%). Comparable adaptations are seen when small-sided games are used in aerobic high-intensity training. The considerable gains in the YYIR test (22% to 28%) and the capacity to complete repeated sprints (2%) indicate that speed-endurance training has a beneficial impact on football-specific endurance. This shows that success in this profession may require a stronger aerobic capacity. Several studies have shown that aerobic capacity is crucial for centre forwards since it is positively connected with the distance travelled at high intensities throughout a game (Castagna et al., 2009; Modric et al., 2021).

The aerobic capacity of professional football players, notably centre forwards, can be significantly influenced by training. It has been demonstrated that endurance training, which includes sports like running and cycling, raises VO₂max and enhances aerobic capacity (Hoff et al., 2002). Small-sided games, which are frequently used in football training, have also been found to be an efficient approach to increase an athlete's aerobic capacity. According to Dellal et al. (2012), both amateur and professional players' VO₂max might be increased using small-sided games. This shows that include small-sided games in training regimens can help centre forwards increase their aerobic capacity.

The physiological requirements of football match-play and the unique needs of various playing positions, mainly centre forwards have been the subject of several studies. For instance, research by Dellal et al. (2012) discovered that centre forwards were able to run and sprint at higher intensities and larger distances than players in other positions. This is why one of the most often used metrics to gauge a player's physical prowess is the top running speed they can achieve during a game of football. According to Rampinini et al. (2007), the average maximal sprinting speed of professional football players is often between 31 and 32 km/h,

however some players can go up to 33 km/h (Rampinini et al., 2007). Nevertheless, most high intensity runs in football are less than 20 metres, making it impossible to run at your top pace. As a result, the value of a player's maximal running speed and the distance they might cover when exerting themselves heavily are occasionally unrelated. Also, various research has looked at the connection between physiological factors and football performance, and they have found that by maximising these characteristics, player performance and injury risk may both be increased (Rampinini et al., 2007; Di Salvo et al., 2007). For instance, Rampinini et al., (2007) discovered that higher aerobic fitness levels were linked to greater football performance, whereas Di Salvo et al., (2007) discovered that anaerobic fitness was also a significant effect.

Moreover, centre forwards performed explosive activities including accelerations, decelerations, and direction changes more frequently. This implies that centre forwards need to be very fit both aerobically and anaerobically, in addition to having explosive power and speed. Di Salvo et al. (2007) discovered that anaerobic fitness was a crucial component of football performance, especially in terms of the capacity to engage in high-intensity activities repeatedly throughout a game. High-intensity actions like running and jumping, which are prevalent among centre forwards, require the employment of anaerobic energy systems. Adenosine triphosphate-phosphocreatine (ATP-PC) and creatine phosphate (CP) are crucial for supplying energy for high-intensity, brief-duration exercises like those required by professional football centre forwards. In the ATP-PC system, accumulated creatine phosphate is broken down to provide energy that may be utilised to restore ATP reserves. This quick process can supply energy for brief bursts of high-intensity exercise, like a sprint or a sharp turn on the football field. Studies have demonstrated that taking a creatine supplement can enhance the amount of creatine phosphate that is stored in muscles, enabling more energy to be produced during intense activity (Bemben and Lamont 2005).

The anaerobic capacity of professional football players, notably centre attackers, may be significantly influenced by training. The training technique known as high-intensity interval training (HIIT) is well-liked for enhancing anaerobic capability. Short bursts of intense activity, followed by rest or low-intensity exercise, make up HIIT. According to research from Chan et al., (2016) HIIT can help professional football players' anaerobic ability. Bangsboe et al. (2006) stated that, professional football players' anaerobic capacity and maximum oxygen uptake were both enhanced after 6 weeks of HIIT. Moreover, HIIT enhanced sprint performance in professional football players, according to Reilly et al. (2004).

According to research, Resistance training can increase a football player's strength and power (Reilly et al., 2004). Resistance training enhanced the maximum strength and leaping performance of professional football players, according to Faude et al., (2013). In addition, resistance training enhanced sprint performance in professional football players, according to research by Little et al, (2009). Professional football players' power and leaping abilities have been demonstrated to increase with plyometric training, which incorporates explosive jumping and bounding drills (Markovic et al., 2007). According to studies, central forwards perform explosive activities including accelerations, decelerations, and direction changes more frequently (Dellal et al., 2012). Moreover, Goto et al., (2015) discovered that centre strikers' power had a crucial role, particularly in terms of their capacity to repel defenders and triumph in aerial duels.

Frencken et al., (2011) stated that to succeed in this profession, agility and quick reactions may be especially important. According to Wong et al. (2010), centre forwards need to be fast to shift direction and dodge defenders, which means they need to be agile and quick to react. The capacity of players to react swiftly to changes in direction or stimuli may be improved with targeted agility and response time training. According to research by Sassi et al., (2009), training in agility and response time increased players' agility, speed, and acceleration. Moreover, Sassi et al., (2009) also stated that agility ladder training enhanced the speed, acceleration, and agility of professional football players.

The capacity of a muscle or set of muscles to contract repeatedly against a resistance for an extended length of time without becoming fatigued is known as muscular endurance (Wilmore & Costill, 2004). It is mostly based on the muscle's oxidative capacity, or the capacity of the muscle to produce energy through aerobic metabolism. Adenosine triphosphate (ATP), which the muscle uses to produce force, is created when proteins, lipids, and carbohydrates are broken down (Wilmore & Costill, 2004). Centre forwards in professional football are affected by a number of variables, including training state, muscle fibre type, and the availability of energy substrates, to enhance their physical endurance. Frequent endurance exercises like running, cycling, or swimming can greatly enhance muscular endurance by raising the oxidative capacity of the muscle (Wilmore & Costill, 2004). Moreover, endurance training increases the capillary density in the muscles, which enhances oxygen supply to the muscle fibres and increases the muscles' capacity for aerobic energy production (Wilmore & Costill, 2004).

The type of muscle fibres also has a substantial impact on muscular endurance, with slow-twitch (Type I) fibres having a higher oxidative capacity than fast-twitch (Type II) fibres

and hence being better able to maintain muscular contractions for longer (Wilmore & Costill, 2004). Yet, because to the rapid movements necessary for this position, professional football centre forwards generally have a combination of Type I and Type II fibres (Folland et al., 2014). Lastly, the availability of energy substrates has an impact on muscle endurance. Because they are the major fuel for intense activity, carbohydrates can have a negative impact on endurance performance (Jeukendrup, 2017). Hence, for professional football centre forwards to build and sustain muscular endurance, correct nutrition including enough carbohydrate intake is essential.

Football injuries are a common occurrence, and central forwards are not exempt from them. Injuries to the lower extremities, such as those to the knee and ankle, are the most frequent type of injuries in football, with central forwards having a higher risk of injury than other playing positions, according to a study by Ekstrand et al. (2011). In one study, it was discovered that hamstring injuries were the most frequent type of muscle damage suffered by professional football players (Ekstrand, Hägglund, & Waldén, 2011). Therefore, centre forwards should have their muscular strength and flexibility improved, especially in their lower limbs, as part of injury prevention strategies. Fatigue is another element that raises the chance of harm. In a study of professional football players, it was discovered that weariness increased the chance of injury by altering the players' movements and making them more susceptible to collisions (Thornton et al., 2017).

Nevertheless, in a different research, football players underwent a second sprint test following each intensive portion of each half as well as at the conclusion of each half (Krustrup et al., 2006). It was demonstrated that players' capacity to do repeated sprints was greatly reduced following strenuous periods in the first half but had recovered by the end of the first half. These findings imply that football players become briefly exhausted throughout a game. To reduce the risk of injuries brought on by exhaustion, injury prevention programmes should also include sufficient rest and recovery times (Gabbett 2016). The playing field itself can increase the risk of injury, especially for lower limb wounds. According to research done on professional football players, knee injuries occur more frequently on natural grass pitches than on artificial turf (Hägglund et al., 2013). Hence, ensuring that the playing surface is suitable and secure for the players should be a key component of injury prevention efforts.

In conclusion, male professional football's centre forwards/strikers have a variety of complicated physiological needs. Football play requires both aerobic and anaerobic fitness, in addition to agility, reaction time, and strength being significant aspects. For centre forwards/strikers to create efficient training regimens and injury prevention measures, it is

crucial to comprehend the underlying physiology of these aspects. The main conclusions from the study emphasise the value of creating training plans that are specifically focused on enhancing central forwards/strikers' lower body strength, agility, and reaction speed. In the end, this will result in enhanced player performance and less injury risk, both of which are essential for male professional football success.

Word count- 2215

Reference

- Bangsbo, J., Iaia, F. M., & Krstrup, P. (2006). The Yo-Yo intermittent recovery test: a useful tool for evaluation of physical performance in intermittent sports. *Sports Medicine*, 36(4), 327-337.
- Bemben, M. G., Lamont, H. S. (2005). Creatine supplementation and exercise performance: Recent findings. *Sports Medicine*, 35(2), 107-125. doi: 10.2165/00007256-200535020-00002
- Castagna, C., D'Ottavio, S., Abt, G., & Activity, G. P. (2009). Activity profile of young soccer players during actual match play. *Journal of Strength and Conditioning Research*, 23(7), 1968-1973.
- Chan, H.C.K., Fong, D.T.P., Lee, J.W.Y., Yau, Q.K.C., Yung, P.S.H. and Chan, K.M., (2016). Power and endurance in Hong Kong professional football players. *Asia-Pacific Journal of Sports Medicine, Arthroscopy, Rehabilitation and Technology*, 5, pp.1-5.
- Dellal, A., Chamari, K., Pintus, A., Girard, O., Cotte, T., & Keller, D. (2012). Heart rate responses during small-sided games and short intermittent running training in elite soccer players: a comparative study. *Journal of Strength and Conditioning Research*, 26(2), 471-476.
- Dellal, A., Hill-Haas, S., Lago-Peñas, C., & Chamari, K. (2012). Small-sided games in soccer: amateur vs. professional players' physiological responses, physical, and technical activities. *Journal of Strength and Conditioning Research*, 26(9), 2478-2487.
- Di Salvo, V., Gregson, W., Atkinson, G., Tordoff, P., & Drust, B. (2007). Analysis of high intensity activity in Premier League soccer. *International Journal of Sports Medicine*, 28(4), 307-312.
- Ekstrand, J., Häggglund, M., & Waldén, M. (2011). Injury incidence and injury patterns in professional football: the UEFA injury study. *British Journal of Sports Medicine*, 45(7), 553-558.
- Faude, O., Koch, T., & Meyer, T. (2013). Straight sprinting is the most frequent action in goal situations in professional football. *Journal of Sports Sciences*, 31(7), 758-764.
- Folland, J. P., Williams, A. G., & Nowell, A. (2014). The influence of soccer-specific fatigue on peak isokinetic torque production of the knee flexors and extensors. *American Journal of Sports Medicine*, 42(2), 393-401.
- Frencken, W., Lemmink, K., Delleman, N., & Visscher, C. (2011). Oscillations of centroid position and surface area of soccer teams in small-sided games. *European Journal of Sport Science*, 11(4), 215-223.
- Gabbett, T.J., (2016). The training—injury prevention paradox: should athletes be training smarter and harder?. *British journal of sports medicine*, 50(5), pp.273-280.
- Goto, H., Morris, J. G., Nevill, M. E., & Sunderland, C. (2015). Effect of playing position on match performance in professional soccer. *Journal of Sports Sciences*, 33(3), 243-249.

- Hägglund, M., Waldén, M., Ekstrand, J., & Hägglund, M. (2013). Injuries among male and female elite football players. *Scandinavian Journal of Medicine & Science in Sports*, 23(4), 337-343.
- Hoff, J., Helgerud, J., & Wisløff, U. (2002). Maximal strength training improves aerobic endurance performance. *Scandinavian Journal of Medicine & Science in Sports*, 12(5), 288-295.
- Hoff, J., Helgerud, J., & Wisløff, U. (2005). Strength and endurance of elite soccer players. *Medicine and Science in Sports and Exercise*, 37(7), 1135-1143.
- Iaia, F.M., Ermanno, R. and Bangsbo, J., (2009). High-intensity training in football. *International journal of sports physiology and performance*, 4(3), pp.291-306.
- Impellizzeri, F.M., Menaspà, P., Coutts, A.J., Kalkhoven, J. and Menaspà, M.J., (2020). Training load and its role in injury prevention, part I: back to the future. *Journal of athletic training*, 55(9), pp.885-892.
- Jeukendrup, A. (2017). A step towards personalized sports nutrition: carbohydrate intake during exercise. *Sports Medicine*, 47(Suppl 1), 5-12.
- Keller, B.S., Raynor, A.J., Iredale, F. and Bruce, L., (2018). Tactical skill in Australian youth soccer: Does it discriminate age-match skill levels?. *International Journal of Sports Science & Coaching*, 13(6), pp.1057-1063.
- Krustrup, P., Mohr, M., Steensberg, A., Bencke, J., Kjær, M. and Bangsbo, J., (2006). Muscle and blood metabolites during a soccer game: implications for sprint performance. *Medicine and science in sports and exercise*, 38(6), pp.1165-1174.
- Markovic, G., Dizdar, D., Jukic, I. and Cardinale, M., 2004. Reliability and factorial validity of squat and countermovement jump tests. *The Journal of Strength & Conditioning Research*, 18(3), pp.551-555.
- Markovic, G., Dizdar, D., Jukic, I., & Cardinale, M. (2007). Reliability and factorial validity of squat and countermovement jump tests. *Journal of Strength and Conditioning Research*, 21(2), 547-554.
- Michalak, J., (2022). Identifying football players who create and generate space.
- Mitchell, S., Mitchell, S.A., Oslin, J. and Griffin, L.L., (2020). Teaching sport concepts and skills: A tactical games approach. Human Kinetics Publishers.
- Modric, T., Versic, S., Drid, P., Stojanovic, M., Radzimiński, Ł., Bossard, C., Aftański, T. and Sekulic, D., (2021). Analysis of running performance in the offensive and defensive phases of the game: is it associated with the team achievement in the UEFA Champions League?. *Applied Sciences*, 11(18), p.8765.
- Mohr, M., Krustrup, P., Bangsbo, J., & Match Performance, F. I. (2003). Physiological profile and activity pattern of young soccer players during match play. *Medicine and Science in Sports and Exercise*, 35(5), 799-807.
- Morgans, R., Orme, P., Anderson, L. and Drust, B., (2014). Principles and practices of training for soccer. *Journal of Sport and Health Science*, 3(4), pp.251-257.

Oliveira, R., Brito, J.P., Moreno-Villanueva, A., Nalha, M., Rico-González, M. and Clemente, F.M., (2021), November. Reference values for external and internal training intensity monitoring in young male soccer players: A systematic review. In *Healthcare* (Vol. 9, No. 11, p. 1567). Multidisciplinary Digital Publishing Institute.

Rampinini, E., Bishop, D., Marcora, S.M., Bravo, D.F., Sassi, R. and Impellizzeri, F.M., (2007). Validity of simple field tests as indicators of match-related physical performance in top-level professional soccer players. *International journal of sports medicine*, 28(03), pp.228-235.

Rampinini, E., Coutts, A.J., Castagna, C., Sassi, R. and Impellizzeri, F.M., (2007). Variation in top level soccer match performance. *International journal of sports medicine*, 28(12), pp.1018-1024.

Sassi, R. H., Dardouri, W., Yahmed, M. H., Gmada, N., & Mahfoudhi, M. E. (2009). Relative and absolute reliability of a modified agility T-test and its relationship with vertical jump and straight sprint. *Journal of Strength and Conditioning Research*, 23(6), 1644-1651.

Thornton, H. R., Delaney, J. A., Duthie, G. M., Dascombe, B. J., & Hickmans, M. (2017). Effects of preseason training on the sleep characteristics of professional rugby league players. *International Journal of Sports Physiology and Performance*, 12(6), 819-824.

Wade, S.M., Pope, Z.C. and Simonson, S.R., (2014). How prepared are college freshmen athletes for the rigors of college strength and conditioning? A survey of college strength and conditioning coaches. *The Journal of Strength & Conditioning Research*, 28(10), pp.2746-2753.

Wilmore, J. H., & Costill, D. L. (2004). *Physiology of sport and exercise* (3rd ed.). Human Kinetics