

## A Glance over Youth Footballers (Soccer) Injury Profile: Next Step Required to Be Professional

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**Conflict-of-interest statement:** The author(s) declare(s) that there is no conflict of interest regarding the publication of this paper.

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Received: June 21, 2017

Revised: August 19, 2017

Accepted: August 21 2017

Published online: October 28, 2017

### ABSTRACT

Youth football players are a special population of players. These developmental years play a key role in talent development and can build a good foundation for future success. Correct and age-appropriate training methods are essential for youth players, not just for development with regard to performance but also with regard to preventing injuries. Injuries sustained during the teenage years can create chronic problems for the player. This population is special because it is during these years that players undergo physical maturation, undergoing the changes within the body that is essential for the transition for child to adult. The rate and manner of physical maturation varies in each individual and planning around these

changes is essential. Training loads, rest, and training types must be individualised to maximise progression as a player and prevent injury. The lower limbs are most susceptible to injury with the thighs, knee, ankles, groin and calf identified as common injury sites. In order to prevent injury, it is important to implement correct injury prevention methods and enhance the support and education of youth coaches in this regard.

**Key words:** Youth football; Development; Muscle; Cognition; Biological age

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Bahdur K, Pruna R. A Glance over Youth Footballers (Soccer) Injury Profile: Next Step Required to Be Professional. *International Journal of Orthopaedics* 2017; 4(5): 819-822 Available from: URL: <http://www.ghrnet.org/index.php/ijo/article/view/2096>

### EDITORIAL

Young footballers are often considered a special population within the sport. The talent and development of players vary and often players that may have the potential to succeed in football are playing with players who are playing for recreation purposes or who might not have the ability to succeed at a higher level. The circumstances surrounding youth football varies in different countries with regard to structure, infrastructure, level of coaching and support, and general football environment. Youth football can be played on high quality grass or artificial pitch surfaces or may be played on sand, and clay or informal pitches. Professional academies and school or college sports are more likely to have a superior level of support and resources when compared to more informal clubs.

Football is associated with running, turning, kicking, jumping, tackling and static and dynamic balance. All of these actions depend on strong variations of muscle performance. Aspects such as strength, power, force, endurance are required by the working muscles. The intensity of the actions often means that muscles creates a predisposition to injury. Coaches are faced with the challenge of loading the players enough for them to adapt and progress, but

not overdoing it, thus causing injury. With the prevalence of youth football, it is important to understand injuries as they relate to youth players. Injury occurrence in youth football ranges between 2-7 injuries per 1000 hours of football in players aged between 13-19 (teens) years old. The number of injuries sustained during training and matches increases from childhood to adolescence<sup>[1]</sup>.

There are several key things that contribute to injuries in youth football. The maturation and normal biological processes that occur during and immediately post puberty are key elements<sup>[2]</sup>. The training loads, intensity and training structure for the player can also overload the body and increase the risk of injury. Lack of proper warming-up, conditioning or injury prevention programs also contribute to injuries. Coaching style, philosophy, knowledge and experience can be key in reducing the risk of injury<sup>[3-5]</sup>. When looking at the long-term view, the aim of youth football particularly early on, is enjoyment and skill development, before progressing to competition and results<sup>[6]</sup>. However, pressure from coaches and parents can lead to players over exerting themselves, not managing or resting when injured, or increase the risk of harmful contact during training and matches. Contact injuries may also occur in youth football and the likelihood increases as age increases.

During puberty, height, total body mass, muscle mass and body fat all increase<sup>[2]</sup>. Growth stimulators including hormones such as growth hormone, testosterone, thyroxine, parathyroid hormone and Insulin-growth factor cause changes in bones and muscles<sup>[7]</sup>. Muscle fibre size increases linearly from birth to young adulthood resulting in increases in strength relative to increases in body size. This means that players now have more strength and power and are capable of exerting greater forces. The capability requires the joints, bones, tendons, ligaments and supporting muscles to also be capable of dealing with the greater forces. From age 10-19 the % of type I fibres decreases in males. There is also an increase in peak maximal oxygen consumption, and a rapid increase in anaerobic power with a steady increase in anaerobic capacity. Muscle phosphocreatine and glycogen stores increase during puberty. The increase in phosphocreatine and stored glycogen increases the anaerobic capabilities of a player and makes them better at short, quick bursts of high intensity actions such as sprinting, jumping, turning etc. Glycogen depletion is higher in older adolescents than at the onset of adolescence<sup>[8]</sup>. This highlights the increase in intensity of actions as teenagers get older.

In early adolescence the likelihood of apophyseal injuries increases and is the most frequent injury between 13-15 years old. The increase is due to skeletal immaturity, muscle-tendon imbalance and repeated microtrauma. The repeated kicking motion also increases the risk of posterior tibial tendon dysfunction. The stress placed on the tendon creates an imbalance with the fibularis brevis and can cause medial longitudinal arch collapse, hindfoot valgus and forefoot abduction<sup>[9]</sup>.

Puberty related changes in the body are based on the individual and some players might develop earlier building muscle mass at younger ages while others might be late developers. It is important when working with adolescents that programs and training loads are individualised based on the biological ages of the adolescent rather than just the chronological age. Early developers are also more prone to injuries than late developers. They suffer a higher number of tendinopathies, apophysitis, groin injuries and reinjury while late maturing boys have more osteochondroses and a higher incidence of more severe injury<sup>[1]</sup>. Skeletal maturity coupled with low muscle strength also increases the risk of injury during puberty.

Youth players are often still developing, 'growing' into their bodies and the normal stress associated with growing will be experienced by a player. This means that it is very important to manage players

activity and give players enough time to recover from the muscle damage that occurs during training and allow the players body to adapt to different training loads. It is also important for coaches to keep track of all the players activity. Youth players might be playing for a club, still play recreationally with their friends or might be participating in other sports or forms of physical activity. It is important to consider all activity when planning and adjusting training volume and loads.

During the growth spurt, players will experience increased muscle-tendon tightness, decreased physique strength, and bone mineralization lags behind linear bone growth<sup>[10]</sup>. The heavier body weight means a greater force which is absorbed through bones and joints. Rapid growth rates coupled with thigh muscle imbalances also increases the risk for lower back pain<sup>[11]</sup>.

Lack of good conditioning can lead to muscle imbalances and inflexibility which will become more pronounced during puberty and unless corrected increase the likelihood of injury. The lower limb is more susceptible to injuries with the thigh being the most common injury site, followed by the ankle, knee, groin and then calf. Ankle sprains, thigh muscle strains and knee injuries are common injuries. Contusions may also be common<sup>[3,6,12]</sup>.

The knee extensors are the prime movers involved in running, jumping and kicking the ball while knee flexors influence stride length (which is key during phases of acceleration and deceleration) and stabilize the knee joint when players are changing direction or turning, and also are important during landing. Players can also increase bilateral imbalances by overusing their dominant leg.

The risk of ACL injuries increase after the age of 12, although there has been several cases observed in 9 year olds<sup>[4]</sup>. There are certain kinematic factors that increase risk of ACL injuries. A combination of anterior tibial shear force, knee abduction and internal tibial rotation can lead to ACL problems. Knee valgus motion with internal tibial rotation and reduction in knee flexion also increases ACL injury<sup>[13]</sup>.

The risk of ankle injury is high because the ankle is in close proximity to the ball increasing the risk of contact injury. Approximately one third of ankle injuries are as a result on contact injuries and these produce longer times on the sidelines. One has to be take into account the cartilage fragility in these stages and include in the diagnose the possibility of a cartilage injury, that could become a severe injury later. Thus correct conditioning is required in order to enable talented players to play at an elite level. Contact from another player may lead to higher lateral or medial forces on the foot and ankle causing excessive musculoskeletal loading and inversion causing injury. Football is also a sport which involves a lot of agility and jumping and sharp changes in action of the ankle during dribbling and shooting with these actions also increasing the risk of injury<sup>[9,14]</sup>.

At youth level, players might also start developing cam and pincer lesions which will affect the future of the player as well and result in the player being prone to develop an impingement. The long-term consequences of this is decreased success and longevity in playing football at a high level and is one of the main causes that decrease the success in elite football.

A study conducted during five seasons at the FC Barcelona Academy looked at football related muscle injuries. It found that there was an increased number of rectus femoris injuries in youth players compared with professionals, and the opposite regarding hamstring injuries. Groin lesions were similar in both groups. The main cause of this type profile was linked to a higher muscle power and stiffness in rectus femoris during growth and the competition and trainings requirements in these ages. The study concluded that in

young players rectus femoris strains are more usual than hamstrings but were less frequent in females (kinematic energy) and futsal (ball size).

Quadriceps injuries occur when the rectus femoris reaches maximal length early during the swing phase during running. Hamstring injuries occur in the second half of the swing when the hamstrings are stretched prior to foot contact. Both injuries increase during eccentric contractions, but rectus femoris injury is related specifically when shooting. The prevalence of this injury in youth players is related to young players having less technical expertise as well as the biomechanics and physics associated with them shooting.

In youth football most injuries occur due to trauma but overuse injuries also occur. Overuse injuries occur as a result of repetitive stress without enough time for recovery or reparation causing microtraumatic damage to bone, muscle or tendons prevalence of overuse injuries can be decreased by proper periodization and monitoring of work: rest ratios and ensuring players have adequate recovery<sup>[6,15]</sup>. This is particularly important when working with players who are heading towards biological maturation and may be hitting their growth spurt and undergoing other hormonal, physical and physiological developments associated with maturity<sup>[10]</sup>.

From childhood into adolescence there is an increased risk of lower back injury coupled with age increases. Back problems may be muscular or structurally occurring. Lower back pain also becomes a precursor for musculoskeletal dysfunction. Players with lower back pain or lower limb instability are likely to experience poor endurance and delayed firing of the hip extensors and abductors. Lower back pain in adolescence can mark the start of a problem that continues into adulthood and contributes significantly to a player's health and risk of other injury. Spondylolysis as a youth player can progress into spondylolisthesis and be a problem for professional players.

Risk of lower back and thigh muscle injuries increases as during the latter phases of the first half with the high risk maintained in the second half. On the other side ankle and knee injuries also are higher at the end of each half but the half time break provides time for adequate recovery enabling the player to go into the second half with reduced risk<sup>[11]</sup>.

Resistance training can be a tool used for injury prevention, but resistance training for adolescence has been controversial. Increased risk of injury when prescribing resistance training in adolescence is the adolescent growth spurt, age, biological maturity, body size, poor coaching, fitness and previous injury. Other factors such as muscle imbalances, inadequate nutrition, improper equipment, poor technique training errors and lack of educated coaches and trainers. These factors often create a hesitance when it comes to resistance training. However, appropriate exercises, loading and rest intervals coupled with proper technique minimise the risk of injury due to resistance training. On the contrary, resistance training can contribute to injury prevention and ensure that muscles are strengthened and able to cope with on field training demands.

In order to prevent injuries proper warm-up protocols targeting balance, neuromuscular control and muscle strength, when conducted using correct techniques. Intensities and work coupled with each individual player profile according basically to the biological age is a key factor in injury prevention<sup>[10]</sup>. Including conditioning programs that target core stability, balance, dynamic stabilisation, eccentric hamstring strength and proper knee alignment also shows great reductions in knee injuries with greatest success related to ACL injury occurrence in youth players aged between 12 and 17. Training that includes, agility, strength, flexibility and improvement of technique enhances injury prevention. This ensures

that the muscles are adequately prepared for the high-intensity training session or match that will follow. These injury prevention programs should be introduced to youth players before or at the beginning of adolescence<sup>[3-5]</sup>. While many youth teams do not have access to full time medical and scientific support, it is important for players and coaches to have someone who can give age appropriate information, advice and ensure procedures followed will ensure not just the development of the player but also the long term health of the player.

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**Peer Reviewer:** Naga Suresh Cheppalli