

# Osgood Schlatter's disease - A burst in young football players

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## ABSTRACT

*Football is the most popular sport in the world. Like any contact sport it is susceptible to various kinds of injuries. It is referred the link between methodology of training and the prevention of overuse injuries in youth as it relates to maladaptive sport programs. There is an increasing awareness to growth related conditions and the relation of musculoskeletal development and the onset of youth related conditions. This article examines one specific injury sustained by children and adolescents who play football, Osgood Schlatter disease, and the main mechanisms whereby such injury occur. The aetiology is complex and the risk factors underpinning injury occurrence are considered, along with injury avoidance tactics.*

**Key words:** Injuries, Youth Sport, Football, Osgood Schlatter Syndrome.

## Introduction

Data from several countries indicate generally similar trends in youth sport participation<sup>1,2</sup>. Over the past decades youth sport programs in Portugal have been modified accordingly to changes in societal movements, alongside to political and demographic changes. Two general ideas emerge, one is that elite programs and consequently sport participation must assure their proficiency leading youth athletes to their real potential; a second wave is that competitive sports are decreasing in youth participation when compared to new organizations, more attractive leisure activities<sup>3</sup>.

Training and competition are the two main subsystems of sport and by definition they are related. Therefore, it is imperative to address quality in youth sport programs through the development of the competitive system<sup>4-7</sup>.

In effect, it must be considered growth and maturation with an overview and implications for teaching and coaching<sup>8,9,10</sup>. When we consider training as a systematic, specialized practice for a specific sport along the year with rigorous schedule and short term or continuous program, we acknowledge the fact that regular training produces changes in height of young athletes<sup>11, 8, 12, 9</sup> as in specific tissues<sup>10</sup> affecting overall performance and the responsiveness of the individual to a specific training regimen<sup>10,13</sup>.

Football is a well-studied sport and, therefore, there is a need to try to reassess the impact of biological maturity status upon the socialization process in youth football<sup>14</sup>. Observations of the physiological demands of competitive young football should always be viewed in close consideration on the process of growing; also, priorities should be placed on skills acquisition, technical aspects and enjoyment of play<sup>15, 16</sup>.

This approach should also be focused on injury prevention, acute and specially overuse injuries often associated with repetitive micro trauma, excessive repetitions of a specific sport activity<sup>17</sup> that recently have been associated with psychological factors, that is, potential stressors that youth sport presents<sup>18</sup>. This article focus on the comprehension of micro traumatology in youth sports in its relation to maturation and biological

references and consequently describes Osgood Schlatter Disease in sporting context.

## Injury and the young football athlete: Epidemiological findings

There is a strong need to evaluate the circumstances of injuries over time in youth sport, so possible preventive mechanisms can be in equation. Although youth sports participation is beneficial on many levels, it is also associated with an increased risk of injury. Risk factors for injury in children and adolescents include the presence of growth cartilage, existence of muscle imbalance, and pressure to compete despite pain and fatigue<sup>19, 20, 21</sup>.

One disease particularly important in young athletes' life is Osgood Schlatter. It is characterized by painful lumps just below the knee and is most often seen in young adolescents, risk factors, often associate include excess weight and overzealous conditioning (running and jumping). While Osgood Schlatter disease is more common in boys, the gender gap is narrowing as more girls become involved with sports. Osgood Schlatter disease affects as many as 1 in 5 adolescent athletes.

Researchers in a retrospective study, dealing with intensity and duration found that during the period of 1976 to 1981, a total of 412 young athletes contacted the Turku Sports Medical Research Unit's (TSMRU) Outpatient Sports Clinic with 586 complaints<sup>22</sup>. These records included 68 athletes with Osgood Schlatter's disease in evaluating the cessation of training in which ages and for how long. Furthermore, the descriptive epidemiology reviews like the 16 years of National Collegiate Athletic Association (NCAA) injury surveillance data for men's basketball identified potential areas for injury prevention initiatives<sup>23</sup> or the ISS data provide information on the general risk and specific types of injuries associated with women's college basketball players over a 16-year period<sup>24</sup> reveal great insight in long term management of youth sport in injury prevention programs. Another study, a prospective cohort study aimed to assess the overall incidence of acute and overuse basketball injuries and identified risk factors associated with ankle sprains and knee overuse injuries<sup>25</sup>.

Long-term planning is a characteristic and requirement of modern training as it can greatly increase training efficiency for future competitions<sup>26</sup>. The more difficult the task the bigger the need for repetition, aiming for qualitative improvement of execution. Modern training programs focus on exhaustive repetition of stereotyped gestures<sup>27</sup>. On the other side, congenital or acquired organic modifications have fundamental importance in the predisposition to some sport injuries<sup>28</sup>. Variations in definitions and methodologies have created differences in the results and conclusions obtained from studies of European football injuries, this fact made comparisons difficult<sup>29</sup>.

It is a fact that while more and more children participate in sports and recreational activities, there has been an increase in acute and overuse injuries; there is an inherent risk of injury<sup>30</sup>. One of the most common sites is at the knee<sup>2,31,32</sup>. In this regard adults differ from children in many aspects. The latter have a larger surface area to mass ratio, children have larger heads proportionately, children may be too small for protective equipment, growing cartilage may be more vulnerable to stresses and children may not have the complex motor skills needed for certain sports until after puberty<sup>2</sup>.

A descriptive epidemiology study in high school sports injury data for the 2005 through 2008 academic years were collected and showed recurrent injury rates and patterns differed by sport<sup>33</sup>. Despite the fact that football is a contact sport, it is perceived to be relatively safe to play<sup>34</sup>. Injuries rates in youth football are higher than in many other contact/collision sports and have greater relative numbers in younger, preadolescent players<sup>35</sup>.

The injury rate in football is high, and studies have shown that the injury rate among players aged 16 years or older approaches that of adult players<sup>36</sup>. However, little is known about the injury risk among the youngest players, that is, players between 6 and 12 years. Other research reports that injury risk among young players of the same age playing organized 5- or 7-a-side football is low, lower than that of adolescents and much lower than at the elite level<sup>36</sup>.

Acute and minor injuries predominate in the statistics, with contusions and abrasions being the most commonly recorded<sup>34</sup>. As one would expect, the majority of football injuries are to the lower limbs, with serious trunk and spinal trauma being rare. With regard to musculoskeletal injuries, young females tend to suffer more knee injuries, and young males suffer more ankle injuries. Concussions are fairly prevalent in football as a result of contact/collision rather than purposeful attempts at heading the ball<sup>35</sup>.

The condition where training takes place is considered a major concern for the prevention of such injuries; investigate the incidence of acute injuries and football-related chronic pain from long-term training. Some studies concerning this issue point out that artificial and natural grass turfs<sup>37</sup>, equipment<sup>28</sup>, atmosphere conditions<sup>38</sup> and of course training program interfere with the exposure of young athletes to the risk of injury.

Because recurrent injuries can have severe consequences on an athlete's health and future sports participation, injury prevention must be a priority. Appropriate rule enforcement and emphasis on safe play can reduce the risk of football-related injuries<sup>39, 33, 35</sup>.

### Specific lesions in adolescence: Osgood Schlatter case

Overuse injuries are not uncommon in children and adolescent<sup>40</sup> as it is one of most common causes of knee pain in young patients<sup>41,42</sup>. In fact, teenage girls and young women are

more likely to have patellar tracking problems<sup>43</sup>. This disease has its common apophyseal injuries in tibial tuberosity site<sup>26,44</sup>, a painful ossicle in the distal patellar tendon<sup>46</sup>.

Micro traumatic lesions are more difficult to assess and general clinics have less experience in dealing with them, both diagnosis and therapy<sup>38</sup>. There is some clinical and biomechanical evidence that growth cartilage in youth and especially articular cartilage are less resistant to micro traumatism of repetition when compared to the adult<sup>1</sup>. In fact, the rising of competition demands carries out a process of debilities in tissue structures due to the bigger magnitude of aggressive mechanisms<sup>47</sup>.

There is an increasing awareness to growth related conditions and the relation of musculoskeletal development and the onset of youth related conditions, therefore this disease vary upon sport participation<sup>48</sup>. Researchers tried to determine skeletal age in children with Osgood Schlatter disease by using radiographs of the knee<sup>48</sup>. They studied 26 children (12 girls, 14 boys). All but one of the skeletal ages fell within the normal range. With normal skeletal maturation and normal physes histologically (previously shown), it is unlikely that an abnormality of physal development or structure is the etiology of Osgood Schlatter disease. Rather, it is most likely a result of tensile stresses on the tibial tuberosity. This is in contrast to slipped capital femoral epiphysis, another common disorder affecting children of the same ages as those with Osgood Schlatter disease, in which physal abnormalities and skeletal maturation anomalies do occur.

Another study found that in male skaters accounted for more than 50% of injuries were due to overuse diseases in elite junior figure skaters<sup>49</sup>. Other investigation made an audit of the severity and nature of injuries in academy youth football<sup>50</sup>. As another investigation point out, this disease is one of the possible etiologic diagnosis which may cause knee pain in adolescent athletes during growth (boys, 12-15 years; girls, 8-12 years), especially when practicing sports activities such as basketball, football, volleyball or running<sup>51</sup>. US yields complete information on the involvement of the tibial tuberosity and of the surrounding soft tissues with the findings of tenderness and focal swelling of the tibial tuberosity, typical of this condition as it can damage bone, cartilage, tendon and serous bursa<sup>26</sup>.

Meanwhile, a retrospective study reviewed all the pediatric patients diagnosed with overuses injuries during a 5 years and 7 months period including Osgood Schlatter disease (*apophysitis tibialis adolescentium*). A total of 506 cases of the overuse injuries were seen during the study period. Seventy-three per cent were male patients. The knee joint was the commonest affected joint while the hip was the least affected joint<sup>40</sup>.

The aethology is complex, one study tries to determine if Osgood Schlatter lesion is produced by avulsion fracture or injury to the patellar tendon<sup>52</sup>. This condition affects human adolescents in which there is partial separation of bone fragments from the tibial tuberosity at the site of insertion of the patellar ligament to the tibial tuberosity.

Following this reasoning another study aimed at evaluating a possible relationship between limited dorsiflexion of the ankle and the occurrence of Morbus Osgood Schlatter in sports-active children brought biomechanical aspects into consideration<sup>53</sup>. In fact, quadriceps femoris muscle contracts eccentrically during the stance phase of running till the beginning of propulsion when the knee reaches the highest level of flexion. Limited dorsiflexion in the ankle joint is associated with a compensatory increased knee flexion, tibial inversion, and foot pronation during the stance phase of running. Theoretically, these compensatory mechanisms might cause increased stress on the quadriceps femoris muscle attachment to the tuberositas tibia.

Another study evaluating thirty-five patients, twenty of them had Osgood Schlatter disease (study group) and the remaining 15 adolescents constituted the control group<sup>54</sup>. The ratio of the distance between the proximal margin of the patellar tendon attachment point to the tibia and the tibial tubercle epiphysis to the distance between the knee joint level and the tibial tubercle epiphysis was higher in the control group. They concluded that if the patellar tendon attaches more proximally and in a broader area to the tibia, it might probably cause Osgood Schlatter disease.

If ossicles occur within the disease pattern of the duration of the complaints is usually extended to twice the normally expected period. Their shape and location influences the clinical course of the disease and surgical removal of these ossifications is the therapy of choice if the complaints persist for a relatively long time<sup>55</sup>.

It is well established that knee pain stops at the end of the growth and that long-term outcome is good for the majority of the patients<sup>56</sup>, with a focus on muscular tightness as a possible causative factor<sup>7</sup>. There are contradictory reports regarding patellar position in the Osgood Schlatter disease. Some studies suggest a *patella alta* at the end of the growth, with the strong pull of the well-developed quadriceps muscle as an etiological factor<sup>11,57</sup>.

### Treatment and recovery

Osgood Schlatter disease runs a self-limiting course, and usually complete recovery is expected with closure of the tibial growth plate<sup>58</sup>. With regard to conservative treatment it has been shown on the basis of the duration of healing that functional therapy with an expansion of the ischiocrural musculature is preferable to immobilization of the joint. So that functional treatment is justified even if there is an increased formation of ossicles on non-immobilization of the joint, since such ossification occurs with only 20-25% of all cases of Osgood Schlatter disease and the duration of the complaints is markedly less enhanced than with immobilization measures<sup>55</sup>.

As far as the sportsman is concerned, this entails only brief loss of training and the possibility to avoid muscular atrophy of the affected leg by means of physiotherapeutic exercise<sup>55</sup>. Although there may be some discomfort in kneeling and activity restriction in a few cases<sup>42, 58</sup>. When patients fail extensive nonoperative management, surgery to remove the symptomatic ossicle must be endured<sup>59, 60</sup> in unresolved cases

arthroscopic technique is an option<sup>61</sup>. The young athlete must be assured that while residual deformity may remain, disappearance of symptoms coinciding with closure of the apophyseal plate is often the end result<sup>62</sup>.

### Osgood Schlatter disease prevention

The long term outcome may not be favorable as they remain equivocal<sup>63</sup>. The small injuries that may cause this disorder are usually unnoticed, so prevention may not be possible. Literature is consensual about regular stretching, both before and after exercise and athletics, can help prevent injury<sup>64,65,66</sup>, that is warm-up exercises before playing sports, especially exercises that stretch your thigh (quadriceps), hamstring and calf muscles as well as knee strengthening exercises. Other more general guidelines suggest that overweight children should be encouraged to lose weight and susceptible children to exercise regularly but moderately, and to avoid weight-bearing activities that put excessive stress on the patellar tendon. Osgood Schlatter disease usually strikes active adolescents around the beginning of their growth spurts, the approximately 2-year period during which they grow most rapidly. Growth spurts can begin any time between the ages of 8 and 13 for girls, or 10 and 15 for boys<sup>67</sup>.

### Conclusion

As final regards it is suitable to remember that during a growth spurt, it is thought that the tendon attaching the quadriceps muscle to the knee joint fails to keep up with the lengthening bone and pulls tight, creating a strain on the growing bone (tibial tuberosity). As one of the most common causes of knee pain in adolescents, surgical treatment is rarely indicated and is generally reserved for patients with recurrent disabling pain unresponsive to conservative therapy. While Osgood Schlatter disease is more common in boys, the gender gap is narrowing as more girls become involved with sports. This disease usually resolves by itself once growth has finished. This may take up to two to three years. Prevention is most associated with good stretching to balance muscle size and function as well as ligaments. Future studies should address longitudinal particularities of young athletes who suffered of this disease.

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## **EKSPLOZIJA “OSGOOD SCHLATTER” BOLIJESTI KOD MLADIH FUDBALERA**

### **S A Ž E T A K**

Fudbal je najpopularniji sport na svijetu. Kao i svaki drugi sport u kojem dolazi do kontakta među igračima, i fudbal je veoma podložan različitim vrstama povreda. Prije svega, ovaj problem se odnosi na vezu između metodike obučavanja i prevencije od pretjeranog povređivanja kod mladih tj. rješenje u osnovi leži u predviđenim sportskim programima koji se izvode. Na sreću, evidentan je porast svijesti kod različitih struktura kada se govori o razvoju predviđenih uslova koji su neophodni za razvoj lokomotornog aparata mladih ljudi. Ova studija ispituje, isključivo jednu specifičnu povredu koja se zove “Osgood Schlatter” a koja se javlja kod djece i adolescenata koji se bave fudbalom, kao i glavne mehanizme zbog kojih se ove povrede pojavljuju. U studiji su razmotreni rizični faktori koji izazivaju javljanje ove bolijesti, kao i strategija za izbjegavanje iste.

**Ključne riječi:** povrede, mladi sportisti, fudbal, “Osgood Schlatter” sindrom.