

Tchoukball

- injury panorama and proposal for preventative
measures

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SUMMARY

Sport has positive health effects but is also associated with injury risks. Tchoukball is a sport that was created with the aim of being a low risk alternative within team sports. The sport was officially introduced in 1970, but until now no investigation has been done into the subject of injuries within tchoukball. The purpose of this project was to investigate the injury panorama within tchoukball och provide proposals for possible preventative measures. The project was based upon injury reports from tchoukball players that were collected between 2004-2006 as well as a literature study concerning handball, volleyball and preventative measures within sport. Of the 66 tchoukball injuries that were reported, a majority (83%) said that they would not have any type of lingering problem while for one player it was not possible to play tchoukball again. 27% of the players could come back within 3 days of their injuries, 43% had an absence of between 4-30 days while the length of absence for 30% was a month or longer. Injured ligaments in fingers (n=12) and feet/ankles (n=9) were the most frequently occurring injuries. Technique training for the fingers as well as taping the fingers after injury are two methods that can probably contribute to a reduction in the number of finger injuries. Even for foot and ankle injuries, specific training can help to reduce the number of injuries. After an ankle injury the use of semi-rigid ankle protection can lead to a reduced risk for recurrence of injury. Knee injuries were not as common, but a clear majority (83%) of them meant an absence of more than 30 days. Out of the literature study came the conclusion that a match situation within many sports produces a greater risk for injuries, something that can very well also apply within tchoukball. The most typical scenario for injuries on sand/grass was that the players were back within a month (12 of 13) while for the other injuries the ratio was lower (32 of 50). The reason for this is however unclear. A majority of the injuries were contact injuries and of these, it was ball contact that was the most common. It was apparent that contact injuries involved a larger percentage of players who came back within 3 days (14 of 39) in comparison with non-contact injuries (3 of 22). Injuries in defence were the most common (n=34); these did however have a larger percentage of players who came back within 3 days (42%) in comparison with the other injuries (13%). For future reference it would be interesting to see additional investigations into injuries within tchoukball, both in order to verify the results from this investigation as well as to widen our knowledge through, amongst other things, studies of the incidence of injury.

INTRODUCTION

It is common knowledge that sport brings with it many positive aspects from a health perspective. But it also involves a burden both socially and economically due to the injuries that occur during participation in sports. Within the EU it is calculated that approx. 700 000 people receive hospital treatment every year as a result of sports-related injuries and that more than 10 million injuries that occur within sports require medical attention.¹¹ Another measure of the significant impact of sports injuries within the health system is that 10-19% of those injuries that are treated at the emergency wards of hospitals are sports-related.² Sports-related injuries are often both difficult and expensive to treat, as well as very time consuming.¹⁰ Petridou (2002) stated in the final report from the EU cooperation concerning sporting injuries, that because of the personal and social advantages associated with sport, that it was most likely that sporting activities would continue to increase. Both Petridou (2002) and Parkkari et al (2000) underlined the importance of preventative work when it comes to sporting injuries, both from a medical and economic perspective.

Tchoukball

An important part of the preventative work is to try to modify the rules for a given sport in order to minimise the risk for injury and/or the degree of seriousness.¹⁰ Hermann Brandt, a swiss biologist och researcher into the effects of physical activity, took however the opposite approach. Through his research he worked with the development of a new sport. The goal was to create a team sport that was spectacular och fast but at the same time contained minimalised risk for injury.¹⁹ In his article from 1970, Brandt opined that there was a lack of sports that took a person as a whole into consideration.³ Hermann Brandt wrote that "The objective of human physical activities is not to make champions, but make a contribution to building a harmonious society".²⁰ Tchoukball was officially introduced in 1970.¹⁵ In order to minimise the risk of injury it was not just the set of rules that was developed but also a document that described the tchoukball philosophy. It described how one should behave, act and think. A setting there respect for one's self, other team mates and the opponents was a fundamental part.³ Today there are 13 official member countries in FITB (The International Tchoukball Federation) as well as a further 22 countries with official tchoukball representatives throughout the world.¹⁶ Amongst those countries where the sport is most popular are Switzerland (with around 1,000 players who regularly play actively, divided up into approx. 20 clubs) and Taiwan.²² During the World Games that will be staged in Kaohsiung (Taiwan) 2009, Tchoukball is one of the sports that have been invited to participate.²¹ In Sweden tchoukball is an unknown team sport. Because of this the basics of the sport are described here, for exact details see appendix 1 or FITB's website <http://www.tchoukball.org/resources/index.htm>.

Tchoukball contains elements of handball and volleyball, in other words certain situations and movement patterns in tchoukball remind one of these sports. At both ends of the playing field there are "trampolines" (= angled frames that support a bouncy net). The objective is for the attacking side to shoot the ball at one of the "trampolines" so that it bounces back onto the field of play. While for the defending team, the objective is to capture the ball before it touches the ground, if they fail to do this then the attacking team receives one point. It is not permitted to hinder the other team through body contact or in some other way stop them from executing their play. (One example is that it is forbidden to cut off passes within the opposition team). Dribbling with the ball is not allowed and the players may take a maximum of 3 steps when they have the ball in their possession. Initially the sport was played indoors, but during the 1990s a version was developed that is played on sand in Brazil. And which has since then spread throughout the world of tchoukball. The main difference, aside from the playing surface, is that the indoor playing area is bigger and a team consists therefore of more players. Seven to nine players per team

indoors compared with the beach version that has 5 players per team. Beach-tchoukball is normally played barefoot.¹⁷ According to FITB the rules regarding equipment are designed to minimise the risk for injury. This means amongst other things that the frame may not contain any sharp edges and that there are specific instructions relating to the hooks that fasten the net to the frame. The ball pressure is recommended to be hard, since a soft ball leads to more finger injuries in defence.²²

What is an injury?

A question that may appear simple at first hand, but Martin Hagglund described in his thesis (2007) the problematics regarding the definition of an injury. There are many different definitions of what constitutes a sporting injury, and each of them has its advantages and disadvantages. This makes the comparison of different studies with each other more difficult. Some of the definitions that he brought to the fore are described here. The definition can be based on the insurance application, in other words an injury has occurred if an insurance application has been made. An injury can also be defined based on the fact that a player has received treatment at a hospital. In order to capture more injuries that affect a player's health the term "time-loss injuries" can be used. This means that an injury causes the player to miss training or a match. This method of defining an injury can be dependent upon how often matches or training occur. It is also sport-specific since that which can cause an absence within one sport, may not make training or matches within another sport impossible. It can furthermore be affected by the level of motivation, the importance of the training/match as well as the individual's pain threshold. Another system of defining injury is to use an anatomically based definition, which is potentially the most objective type of definition, and which makes comparisons between different sports possible. This method is however dependent upon how active the observer is in contacting injured players, as well as the availability of medical staff.⁷ In the article from Parkkari et al (2000) it was regarded as optimum if no-time loss injuries were also reported, so that serious injuries that did not incur an absence from the sport could also be taken into account.

Definition of degree of seriousness

van Mechels et al (1992) defined the degree of seriousness based on seven criteria.

- The nature of the sport
- The length of treatment
- The type of treatment
- Absence from sporting activity
- Absence from work
- Permanent injury
- Cost

One of the most common methods used within football to divide injuries into different degrees of seriousness is to go after the length of absence. Light injuries mean an absence of 1-3 days; lesser injuries when the absence is up to a week; medium injuries mean an absence of between 1-4 weeks och large injuries when the length of absence is over 4 weeks.⁷

Van Mechelens prevention model

Van Mechelen et al developed a prevention model whereby preventative measures are based upon epidemiological research. It consists of four steps. Firstly the scope of the injury problematic is evaluated by describing the incidence of injury, the degree of seriousness of the injuries as well as the type of injury and the location. The next step is to identify the risk factors and the injury mechanism. Which then allows the introduction of preventive measures that are likely to reduce the risk of future injuries and/or the degree of seriousness of the injuries. Finally the effects are evaluated in accordance with step 1, ideally through a randomly controlled study.^{4, 12}

Factors and mechanisms related to injury

Bahr et al (2005) pointed out in their article that, in order to be able to design a specific prevention program, it is vital to use the multifactorial model that Meeuwisse has produced. This consists of two parts. Risk factors that describe why a certain individual is in danger in a special situation and the injury mechanism that explains how the injury occurs. Although it can appear that the injury purely occurs because of an initiating event, it is in fact more complex than this. The injury is the result of interactions between internal factors, external factors and the injury mechanism.²

The internal factors are those that are specific to the players. They include age, gender, build, skill as well as previous injuries and psychological factors. These predispose a player to injury. The internal factors can be divided up into modifiable factors and non-modifiable factors. The modifiable factors can be targeted for specific training methods while the non-modifiable (e.g. gender, previous injuries) can be used to identify players that are exposed to increased risk.⁴ The external factors are environmental factors. They are related to the type of sport, equipment, level, training.¹¹ Concrete examples are surface friction, wrong type of shoes.⁴ When a sportsman is exposed to external factors they are integrated with the internal factors and cause the individual to be more or less receptive to injury.^{2,4} This alone is however not sufficient, it is also necessary that there exists a causal event, which is described by Bahr et al (2005) as the final link in the chain that causes injury. This causal event is described through the injury mechanism. In the case of acute injury this event is directly related to the beginning of the injury. The injury mechanism describes the player's situation, the behaviour of the player and the opponents. At the same time there exists a biomechanical description (both all-embracing and detailed). Bahr et al (2005) point out in their article the importance of not only describing the biomechanical injury mechanisms but also of even giving consideration to the situation and behaviour.² This model is however not optimum for injuries caused by over exertion since it does not take account of the training routine or competitive schedule. In the case of injuries due to over exertion the initiating event is not some random occurrence but is instead the most recent program for competition and training.⁴ See table 1 for a description of the internal and external factors as well as the injury mechanism.

Table 1. Grouping of internal and external factors as well as injury mechanisms

Internal factors	External factors	Injury mechanisms
- Age	- Match or training	- Player situation
- Gender	- Protective equipment	- Player's behaviour
- Build	- Sporting equipment	- Opponent's behaviour
- Previous injury	- Environment (e.g. surface)	- General biomechanical description
- Skill	- Level	- Detailed biomechanical description
- Psychological factors	- Time of occurrence	

Questions at hand

A proper follow-up of the injuries that occur within tchoukball has not occurred previously. This means that there is no direct knowledge about the scope of injuries within tchoukball, what type of injuries that are most prevalent and still less knowledge about how these could be prevented. The International Tchoukball Federation (FITB) has however expressed a desire to have these areas investigated. The aim of this project is therefore to illustrate the injury panorama within tchoukball and through a study of literature, describe possible preventative actions; as well as to evaluate the existing collection of investigations into tchoukball that have been done previously. The questions that are going to be dealt with are:

- What type of injury occurs most frequently within tchoukball?
- Which situations are most frequently associated with injuries within tchoukball?

- What characterises the injuries that occur (absence, risk for lasting harm, need for measures)
- Which factors are of importance with regards to the degree of seriousness?
- Are preventative measures taken, and which additional measures could be taken?

MATERIALS AND METHODS

This project consisted of two parts. One part consisted of a literature study with focus on volleyball injuries, handball injuries and preventative measures within sport. The other part was based on injury reports that were generated in connection with the practice of tchoukball.

Literature study

The literature study was based on nine articles, one thesis and two reports as well as one book. Articles about relevant topics were sought primarily through PubMed och Cochraine. Articles and literature have been sought both in English and Swedish. Focus has been placed on sports injuries within volleyball and handball as well as preventative measures for team sports. All literature and articles relating to these areas have however not been examined. The result was later summarised in order to give an overall picture of these three areas. One problem with the comparison of different sports studies is the existence of differing definitions of injury. Here the definitions of injury used by the authors of the various articles are described. Olsen et al (2006) saw an injury as something that required medical treatment and that resulted in a player missing parts of a match or more. Time-loss injuries were defined as those injuries that meant that the player was absent the next day or longer from team activities (match or training). Junge et al (2006) defined an injury as a physical complaint that occurred during a match and that received medical treatment. Verhagen et al (2004) had the definition that an injury was something that resulted from the practice of volleyball and caused the player to stop his/her activity or to not be able to fully participate in the next planned activity. For Bahr et al (1997) an injury was something that occurred suddenly during an organised volleyball training session or match and that resulted in at least one day's absence from training or match.

Injury reports

The study of injuries suffered by tchoukball players was based on injury reports that were collected during the period 2004-2006. These reports were intended for all that played tchoukball regardless of level (beginner – international), gender or age. After occurrence of the injury, the player or some other individual responsible for the team/group filled in the injury report that was available at FITB's website (<http://www.tchoukball.org/resources/injuries.htm>). The report was then sent to the technical commission of the FITB, there Michel Thomann has the head responsibility. It could not be seen from the report when the injury report was sent in, which can mean that there has occurred a certain variation in knowledge about the exact injury and degree of seriousness, depending on how long after the injury occurred that the report was sent in. Everyone who felt that they had been injured during the playing of tchoukball, regardless of the degree of seriousness, was to report on their injury. It is therefore that person who has filled in the report, who has made the judgement that it was an injury as well as what type of injury. The availability of medical staff and medical knowledge has therefore depended upon the person who reported the injury. A standardised method for diagnosing the injuries has not existed.

Information dissemination

FITB informed the various national tchoukball organisations that they should report injuries that had occurred in connection with tchoukball as well as forward the information to clubs and players. This information about the need to report on injuries was also advertised through FITB's newsletter. Efforts were also made to make referees aware of the existence of the report and mo-

tivate them to spread information about it. Finally extra efforts were made to make players and trainers in national teams conscious of this project. The problem with this investigation is that it is not possible to determine the level of reporting that has occurred and it is therefore difficult to determine how representative the results are outside of the group that has been studied.

Content of injury reports

67 reports were received of which one was excluded from the material since it was a referee that had been injured. The material that was analysed consisted of 66 reports. The report that has been used has contained four areas of information: the occasion, the player, the injury and the contact details of the person that reported the injury. Information about the occasion included date, town/city, country, club, if the injury occurred during a match or training, level and surface. Information about the player included age, gender, if they were right or left handed, experience of playing tchoukball, time spent playing tchoukball during the preceding seven days, when during the injury occasion that the injury occurred as well as if there was any particular type of equipment that was involved. Information about the injury included which part of the body that was affected and if that part of the body was already known to be weakened, eventual diagnosis, length of absence, type of occurrence when the injury was sustained, if there was any contact in connection with the injury and the possibility to recovery. See appendix 2 for the exact formulation of the report.

Participants in the tchoukball survey were informed via FITB that the reports were to be used for research purposes in order to contribute to increased knowledge about injuries within tchoukball and to in the long run improve preventative measures. By sending in the injury report they had approved its use for research purposes. In order to protect the confidentiality of the players, each player was assigned an individual code when the data was analysed.

Statistical methods

Data from the reports was analysed statistically by SPSS 13.0. The statistical methods used were frequency description, cross tables and chi-2 tests. The level of significance was set to 5%. The questions that had more than two different answer alternatives and where dividing into dichotomous groups was not possible, were presented with the help of frequency descriptions. This concerned body part, diagnosis and eventual existence of equipment involved with the injury as well as homeland and year the report was made. For questions that had several answer alternatives and where dividing into dichotomous groups was a possibility, a grouping of the answer alternatives occurred. They were then analysed through use of cross tables and chi-2 tests. This concerned age, level, surface, experience, playing time during the preceding seven days, at what time during the injury occasion that the injury occurred, length of absence, possibility to recovery and if some form of contact was involved in the injury. The groupings were done in order to create clinically relevant groups and at the same time make them possible for analysis. The questions that had dichotomous answers were presented through frequency description, cross tables and chi-2 tests. This concerned gender, if it was a match or training, if the body part had been previously weakened as well as the type of moment (attack, defence or injury due to over exertion).

It was the person who reported the injury that filled in the diagnosis or in some other way described the injury. Some used medical terms while others used less specific descriptions. From this information seven main groups for different types of injury were formulated. Those people who reported that they had some sort of skeletal injury or effect were placed in the group "Fractures", even if other types of injuries had also occurred for those people. "Joints (non-bone) and ligament injuries" is a main group consisting of two subgroups: ligament being one and meniscus/cartilage being the other. Injuries were sorted into these groups if the report noted that the player had suffered from such a problem but there had not been any skeletal effect. "Muscles and

tendons” consists of those injuries that affect either muscles or tendons. The group “Bruises” contains the injuries that were reported to solely involve bruises. “Sores” included only those that had received sores or sores and bruises. “CNS/PNS” is the group for those that received some type of effect on the brain or peripheral nerves. The group “Other” consisted of those that had described their injury in looser terms. Examples are that the report said that it hurt, that it was some type of wear and tear or reduced functionality; in other words a number of these injuries would have been placed in one of the other groups named above if the requisite knowledge had existed.

Question 3.6 was formulated in such a way that there were different ways of interpreting it. It was not made clear in the instructions how the person filling in the report should act if the answer was negative. Because of this some people only put a cross against the ‘yes’ answers and left the other parts of the question blank. In these cases the blanks have been interpreted as if the answer should have been ‘no’. With regards to those reports where crosses were not made for either the ‘yes’ or ‘no’ alternatives, this question in those reports was interpreted as redundant.

For question 2.4 (experience), 2.5 (playing time during the preceding seven days) and 3.3 (length of absence), the answer alternatives overlapped each other either completely or partly. The answer alternatives for question 2.4 (“Tchoukball player for:”) were: less than two months, between two and six months, between six months and one year, between one and three years, between three and six years or over six years. The material was divided up in two groups. One group consisted of players with experience up to six years while the other group consisted of players with experience of more than six years. In this way no overlapping was possible when the question was analysed. The answer alternatives for question 2.5 (“Number of hours spent playing tchoukball during the preceding seven days:”) were: 0-2 hours, 2-4 hours, 4-8 hours, 8-12 hours and more than 12 hours. Here the material was divided up in two groups, with the dividing limit set to 4 hours. This means that these groups do not exclude one another. The answer alternatives for question 3.3 (“Seriousness (absence from tchoukball field in number of days):”) were: Less than 1 day, 1-3 days, 4-7 days, 7-30 days, 1-3 months or more than three months. Here the material was divided up in three groups: ≤ 3 days, 4-30 days, ≥ 1 month. In this case the last two groups do not exclude one another, but there is an overlapping of approx. two days.

Since no earlier investigation into tchoukball injuries has been done there may exist an interest for a comprehensive statistical description of the different factors’ relationship to each other and to the injuries. To this end there is a comprehensive statistical material presented in a table appendix.

RESULTS – LITERATURE STUDY

The group that is most frequently afflicted by sports injuries is those in the age group 10-34 years. It can probably be deduced from this fact that exposure to sport is at its highest during these ages. Adults are often more prone to injuries of the lower extremities while the injury profile for children is different. More than 50% of injuries to children affect the upper extremities. In general men have a higher injury frequency than women. Although within certain specific sports the level of incidence is higher for women.¹¹ For the most part an individual that has previously suffered on injury runs an increased risk of injuring themselves, regardless of sport.⁴

One problem that has received much attention within many pivoting sports is knee injuries, and especially acute cruciate ligament injuries.^{1,2,8} Women are often extremely vulnerable to such injuries and can be exposed to three to five times higher risk than men.² What makes these knee injuries even more dangerous is that osteoarthritis can develop later in life.^{2,10}

Handball

Despite the fact that handball injuries have been examined in many studies, there is no unequivocal picture concerning the level of incidence or the character of handball injuries.⁸ During the handball tournament at the 2004 Olympics the level of incidence for injuries was 114/1000 playing hours. For men the level of incidence was 89/1000 playing hours while for women it was 145/1000 playing hours. However more of the injuries to men resulted in absence so that the level of incidence for time-loss injuries was at the same level for men and women (36-40/1000 playing hours). These injuries made up 38% of the total number of injuries.⁸ Olsen et al (2006) presented an incidence level for acute injuries resulting in absence during a match of 7.4/1000 playing hours for handball-playing youths. They concluded that the result was at the same level as for many other handball studies; where the incidence level for time-loss injuries during a match was 8.9-14/1000 playing hours for youths and 11.2-14.3 /1000 playing hours for seniors. For the youth players in the study by Olsen et al (2006) 78% of the injuries that the trainers reported were time-loss injuries. Neither Olsen et al (2006) or Junge et al (2006) found any significant difference in the level of incidence for those injuries that led to absence between women and men. On the other hand there was a significant difference between match and training for the youth players; there the level of incidence for acute time-loss injuries during training was nearly one tenth of that measured during matches (0.8/1000 playing hours during training). They concluded that even these results were at the same level as for other studies; 1.7-4.3/1000 playing hours for youths and 0.6-2.4/1000 playing hours for seniors.⁹ During the Olympic tournament the spread of frequency of injuries occurring during the first and second halves was also measured. No significant difference was found. 44% of the injuries occurred during the first half and 56% during the second half.⁸

In both studies it was found that injuries to the lower extremities were most common.^{8,9} For Olympic players it was then found that head injuries were the second most common (34%) followed by injuries to the upper extremities (15%). The most common injury that caused absence from play was damaged ankle ligaments. All of the three knee ligament injuries recorded were for female players.⁸ Olsen et al (2006) reported that the most common acute injury was twisted ankles (23%) followed by problems with ligaments in the knees (14%) and sprained fingers (10%). Of those Olympic players who were forced to miss play because of their injuries, a clear majority (71%) came back within one week. 8% of the injuries resulted in an absence of longer than four weeks.⁸

Injuries involving contact were dominant both in the study by Olsen et al and that by Junge et al.^{8,9} Over half of the injuries for the youth players occurred in connection with contact with an

opponent.⁹ For the Olympic players, 86% of the injuries involved contact (it was however not specified here what type of contact that was involved). Of the injuries due to contact, 65% were adjudged to have been caused by foul play. When only those injuries that caused player absence were evaluated, 79% were found to be contact injuries; of which 46% were caused by foul play.⁸ Olsen et al (2006) concluded also that a majority of the injuries occurred during attacking play.

Table 2 Summary of handball and volleyball articles used in the literature study

Author	Sport	Incidence of injury (per 1000 playing hours)	Biggest risk (match vs training)	Typical injury
Bahr et al	Volleyball	1.7 (time-loss)	match	sprained ankle
Junge et al	Handball	36-40 (time-loss)	-	sprained ankle
	Volleyball	5.5*	-	sprained ankle
Olsen et al	Handball	7.4 (total)	match	sprained ankle
Verhagen et al	Volleyball	2.6 (total)	match	sprained ankle

* per 1000 played matches

Volleyball

The level of incidence for time-loss injuries within volleyball was reported by Bahr et al (1997) to be 1.7/1000 playing hours. For training the incidence level was 1.5/1000 playing hours and for matches 3.5/1000 playing hours. Verhagen et al (2004) found that the total level of incidence for injuries was 2.6 injuries/1000 playing hours. This is a result that is supported by earlier studies where the incidence level has been between 2.3-3.8 injuries/1000 playing hours. For acute injuries the level of incidence was 2.0 injuries/1000 playing hours.¹³ During the 2004 Olympic tournament the level of incidence for those injuries that caused absence was 5.5/1000 played matches.* They represented 83% of all volleyball injuries.⁸ Verhagen et al (2004) noted no significant difference in the level of incidence for injuries between men and women. They found that the total risk for injury was higher during a match (4.1/1000 playing hours) compared with training (1.8/1000 playing hours).

Damaged ankle ligaments were the most common problem for volleyball players.^{1, 8, 13} These injuries accounted for between 25-50% of all injuries. Players with previous ankle injuries ran a higher risk of being injured again. This was especially true during the first 12 months after the earlier ankle sprain.^{1, 13} The main injury mechanism for these injuries was that a player jumped up and then landed on the foot of a teammate or opponent.^{1, 2, 13} Finger injuries were not a common occurrence in the study by Bahr et al (1997), where they accounted for 7% of injuries, or in the study by Verhagen et al (2004). One explanation was that finger injuries seldom led to absence from training or match and were therefore not classified as an injury.¹³ Cassell (2001) pointed out instead that hand injuries and finger injuries are commonplace for volleyball players, and that they are neglected when it comes to preventative measures. Knee injuries accounted for 8%

* For handball matches during the 2004 Olympics the corresponding number was 3.8.

in the study by Bahr et al (1997). Verhagen et al found no overrepresentation amongst the female players when it came to cruciate ligament injuries. Because of this it was pointed out that women might not necessarily run a higher risk of receiving knee injuries within volleyball.¹³ For Bahr et al (1997) 33% of those that were injured were absent for more than 2 weeks. Most had some type of ankle injury, knee injury or back injury. Verhagen et al (2004) reported an average absence of 4.3 weeks. In many cases with regards to the Olympic players, no length of absence was given.⁸

Prevention

In the EU report by Petridou (2006) general measures in order to reduce the number of sports injuries were presented. There was a general consensus that the Preparticipation Exam (PPE) should be given to all who wish to participate in sporting activities. There was also consensus over that warming up and warming down can help to prevent injuries. It was however pointed out that the methodology must be very sport specific. On the other hand there were varying opinions about the role of stretching in reducing the risk of injury.¹¹ In two random control studies it had not been possible to prove any positive effect from stretching.¹⁰ Based on existing literature Martin Hagglund (2007) came to the conclusion that multimodal interventional programs can reduce the number of injuries in football. Even weight training and interventions of cognitive behavioural character can provide preventative advantages, but that there is a need for further studies in order to verify this. On the other hand teaching/demonstration on its own provides no reduction in frequency of injury.⁷ It is vital to change rules and have strict rulings by referees in order that, amongst other things, the number of violent contacts between players be reduced.^{10,11} Additionally, fair play has a significant role within the prevention of the occurrence of injuries.^{8,11}

Prevention program

Garrick et al (2005) described a random evaluation of a warming up program for 16-17 year old handball players in Norway, performed by Olsen et al. The program had the objective of improving the attention and control for knees and ankles. It led to a reduction to half the number of acute knee injuries and ankle injuries. Even injuries to the upper extremities were reduced. Furthermore there were fewer players in the intervention group who received injuries that resulted in an absence. It was suggested that the warming up program could be equally successful within other sports where the pattern of injuries is similar to that in handball. Garrick et al (2005) meant that the study should lead to increased attention to the role of warming up exercises as preventative measures for knee injuries and ankle injuries.

Martin Hagglund (2007) examined the effects of a 10-step rehabilitation program that was primarily targeted towards injuries to the lower extremities. The program helped trainers in their assessment of rehabilitation and their decisions regarding a return to play, without requiring the close supervision of medical staff. There was a significant reduction in the risk for new injury for the players in the intervention group. It was shown that the avoidance of premature return to play was a vital part of the intervention program. Hagglund proposed that the rehabilitation program could, with some modifications, be used in other sports in which the knee is exposed to explosive movements.

Apart from the physical effects of the actual training, it might be so that preventative programs increase consciousness about the risks for personal injury and that they even contribute to risk reduction.¹⁰

Lower extremities

Parkkari et al (2000) found that ankle injuries and knee injuries can be difficult to prevent. They saw regular ankle training with the help of a platform as being a promising strategy for preventing both these types of injuries. The advantages with ankle training are also underlined by other studies and reports.^{7,11} When it comes to knee injuries Martin Hagglund (2007) concluded, based on

literature, that neuromuscular and proprioceptive training reduced the frequency of serious knee injuries. For those who have unstable ankles the use of ankle stabilisers (e.g. semi-rigid strapping products) can lead to a reduction in the risk of suffering ankle sprains.^{7,11} Even taping can lead to fewer ankle injuries.¹ On the other hand there is no strong connection between how high up on the ankle one's shoe reaches and frequency of ankle sprains. The use of footwear could however be an explanation for the high frequency of ankle sprains. When barefoot, one's positional sense is precise. When an individual uses shoes then this positional sense is disturbed. It is therefore important to choose shoes that retain the maximum tactile feeling possible.¹⁰

Fingers

In the final report by Petridou (2006) there was consensus that volleyball players should tape their fingers. Cassell (2001) concluded that, within volleyball literature, there only exist two proposals for preventative measures when it concerns finger injuries. These are a hand protector and technical training. There were no exact details about how the technical training should be structured. Taping was recommended for rehabilitation. In order to achieve sufficiently strong biomechanical support the finger should be taped to another finger or a splint. A promising development when it comes to tape has been the thermoplastic variety. Cassell pointed out that taping to a splint should not be done prophylactically, since a long period of reduced mobility can weaken the joint. A simple but very important measure was to remove jewellery and rings before playing.⁵

RESULTS – TCHOUKBALL INJURIES

66 Injury Reports about injured tchoukball players were registered with FITB (The International Tchoukball Federation) during the period 2004-2006. (One of the injuries did however occur during 2003). A clear majority of the reported injuries were from Swiss players (n=51). A further nine reports were from players from the rest of Europe while four were from players outside of Europe. In two of the reports the player's nationality was not stated. 25 of the reports were from women and 41 were from men. The range of ages was spread from 11-45 years. The average age was 25.4 years (std: 7.8 years). See table appendix, table 3.1 and 3.2 for exact details.

Types of injuries and location

Fingers were the most frequently injured (n=25, 38%), followed by ankle/foot injuries (n=20, 30%). The remaining part, not quite a third, consisted of head injuries (n=7, 11%), knee injuries (n=6, 9%) as well as other injuries (n=8, 12%). The most frequently occurring type of injury was some form of ligament damage (n=26, 41%), followed by fractures (n=8, 13%), sores (n=7, 11%) and damaged tendons (n=6, 9%). Other types of injuries that occurred were muscle problems (n=3), bruises (n=3) and meniscus or cartilage problems (n=2) as well as CNS/PNS (n=1). 56% (23/41) of the injuries for men were joint-related (ligament injuries as well as meniscus/cartilage problems) while for women this number was 22% (5/23). The most common type of injury for women was tendon or muscle injury 30% (7/23). For the men it was only 5% (2/41) who had a muscle or tendon injury. For more details see table 3 and table appendix, table 3.3.

Table 3 Distribution of type of injury over body parts

	Women	Number Men	Total
Diagnoses (N=64)			
<u>Ankle-Foot</u>			
Ligament	1	8	9
Muscle and tendon	4	2	6
Bruise or sore	0	4	4
Other	1	0	1
<u>Finger</u>			
Fracture	2	4	6
Ligament	2	10	12
Bruise or sore	1	2	3
Other	2	1	3
<u>Knee</u>			
Ligament	1	2	3
Meniscus and cartilage	0	2	2
Other	1	0	1
<u>Head</u>			
Fracture	1	0	1
Bruise or sore	1	2	3
CNS/PNS	1	0	1
Other	0	1	1
<u>Other part of body</u>			
Fracture	0	1	1
Ligament	1	1	2
Muscle and tendon	3	0	3
Other	1	1	2
Total	23	41	64

Joint and ligament problems in fingers (n=12) as well as in ankles and feet (n=9) were the two most frequently occurring diagnoses. Other common diagnoses were skeletal problems in fingers (n=6), muscle and tendon problems in ankles and feet (n=6) as well as joint and ligament problems in knees (n=5). See table 3.

Degree of seriousness

63 of the players experienced an anticipated length of absence from tchoukball play. For 17 players (27%) the injury meant a short absence, in other words the player returned within 3 days. Most frequently occurring was a medium length of absence, which was between 4-30 days (n=27, 43%). 19 players (30%) were expected to receive a long absence, which meant one month or longer. 86% (54/63) of the injuries were "time-loss injuries", meaning absence from training or match for at least one day after the injury occurred. 52 of the players regarded themselves as having recovered fully after their injuries. 11 players reported that they would have some form of remaining problem. (1 of them stated that it would not be possible to play tchoukball again). Three did not answer. There was no significant difference between men and women in terms of length of absence or recovery. See table 4 and table appendix, table 3.4-3.5.

Table 4 Frequency description for absence and recovery after injury.

	Women	Number Men	Total
Absence (N=63)			
<1 day	1	8	9
1-3 days	3	5	8
4-30 days	13	14	27
≥ 1 month	6	13	19
Total	23	40	63
Recovery (N=63)			
Complete recovery	18	34	52
Remaining problem	6	5	11
Total	24	39	63

A majority (4/7) of the players that received head injuries returned within three days. When it came to both foot/ankle injuries (6/20) and finger injuries (7/23), 30% were back within three days. None of the six players with knee injuries had a short absence. All that only had bruises (3/3) experienced a short absence while nearly half (3/7) of those with sores returned within 3 days. Just over a third (9/26) of those with joint problems returned within three days. None of the players with a muscle injury or tendon injury had a short absence (0/9). The types of injuries that caused players to be absent for one month or longer were skeletal injuries (3/8), joint injuries (10/26) as well as muscle and tendon injuries (4/9). With regards to different body parts it was only knee injuries that meant that a majority of the injuries (5/6) caused an absence of 30 days or more. Finger injuries (6/23, 26%) and ankle/foot injuries (6/20, 30%) had approximately the same percentage of players that experienced a long absence after their injury. The majority of knee injuries (4/6) resulted in some type of remaining problem after the injury. For the other groups at least 80% of the individuals made a full recovery; while a full recovery was possible for the majority of individuals within every injury group: skeletal injuries (6/7), joint injuries (21/27), muscle and tendon injuries (5/8) as well as bruises and sores (10/10). For more details see table appendix, table 3.6-3.8.

Internal factors

50% (8/16) of the players who were 31 years or older were absent for one month or longer after their injury. This number was 23% (11/47) amongst the younger players. A difference that was significant ($p < 0.05$). With regards to the number of players who had a short absence and the number of players who made a full recovery there was no significant difference between the two age groups. There was a large difference in the level of experience within tchoukball, from players with less than two months experience ($n=8$) up to those with more than six years experience ($n=27$). There was no significant difference in the degree of seriousness of injury when those with a long experience of tchoukball (more than 6 years) were compared with those who had less experience. For 12 of the players the injured body part had suffered some sort of injury previously. Regardless of whether the injured area was already a vulnerable area or not, this made no significant difference when it came to recovery or length of absence. There was no significant difference between women and men when it came to these internal factors. See table 5 and table appendix, tables 3.9-3.12.

Table 5 Length of absence in relation to age group and previously weakened body part

	Number			Total
	Short absence ≤ 3 days	Medium absence 4-30 days	Long absence ≥ 1 month	
Weak body part (N= 63)				
Yes	2	5	5	12
No	15	22	14	51
Total	17	27	19	63
Age group (N=63)				
≤ 30 years	13	23	11	47
≥ 31 years	4	4	8	16
Total	17	27	19	63

External factors

Most of the injuries occurred indoors ($n=51$). 14 cases were from beach-tchoukball and one case involved a grass surface. Of those who injured themselves on sand or grass, all apart from one came back within one month (12/13, 92%). Of those who were injured indoors, 64% came back within one month (32/50). A difference that was significant ($p < 0.05$). The material relating to sand or grass surfaces was however limited to 14 reports. With regards to the different types of surface there was no significant difference in the number of players who had a short absence or the number of players who made a full recovery. Of the 58 reports that contained the point in time during the training/match that the injury occurred, 26 reported that the injury occurred within the first half hour. Of those who were injured during the first 30 minutes of play, 48% (11/23) came back within 30 days. Of those who injured themselves after the first half hour, 84% (27/32) came back within 30 days. A difference that was significant ($p < 0.05$). When injuries that occurred during the first half hour of play were compared with those injuries that occurred at a later stage of play there was no significant difference in terms of the number of players that had made a full recovery or the number that had a short absence. There was no significant difference in the degree of seriousness (in other words length of absence and recovery) with regards to player level (beginner/regional compared with national/international), occasion (training or match) and hours spent playing tchoukball during the preceding seven days (≤ 4 hours compared with ≥ 4 hours). No significant difference was visible between men and women with regards to the external factors that were evaluated. In six of the cases of injury some type of playing equip-

ment was involved. These were knee protection (n=2), sunglasses (n=2) and finger protection (n=2). See table 6 and table appendix, tables 3.12-3.16 for further details about external factors.

Table 6 Length of absence in relation to playing time and surface

	Number			Total
	Short absence ≤ 3 days	Medium absence 4-30 days	Long absence ≥ 1 month	
Time played when injury occurred (N=55)				
0-30 min	5	6	12	23
≥31 min	9	18	5	32
Total	14	24	17	55
Surface (N=63)				
Indoors	12	20	18	50
Sand or grass	5	7	1	13
Total	17	27	19	63

Injuries caused by over exertion

Six of the players reported that their injury was due to over exertion. Three of these injuries resulted in medium absence and the other three in long absence. Four said that they had made a full recovery while two meant that they would have some type of remaining problem. Four women and two men made these reports. Five of the injuries were muscle or tendon injuries; of which three were ankle-foot injuries. The sixth injury concerned a finger. See table appendix, table 3.17-3.20.

The injury mechanism

A majority of the injuries occurred during defensive play (n=34), while just over a third occurred during attack (n=23). For the other nine players their injury occurred neither in attacking nor defensive play. There was no significant difference between men and women in terms of the phase of play during which the injury occurred. Of those players who were injured during defensive play, 42% (13/31) came back within the next 3 days. The corresponding number for players who were injured during some other phase of play was 13% (4/32). A difference that was significant ($p < 0.05$). 17% (4/23) of those who were injured during attacking play returned within 3 days, while the corresponding number regarding those injured during some other phase of play was 33%, a difference that was not significant. No significant difference was found amongst players who had a long absence when the different phases of play were compared. 81% of those who were injured during attacking play were able to make a full recovery while the corresponding figure for players injured during other phases of play was 83%. Of those who injured themselves during defensive play, 91% made a full recovery as compared with 73% of those injured during other phases of play. A difference that was not significant. See tables 7-8 and table appendix, tables 3.21-3.23. For fingers (which were the most frequently affected part of the body) the majority of injuries occurred during defensive play (18/25) while five injuries occurred during attacking play. Foot/ankle injuries were the second most common, half of which occurred during attacking play (10/20) while five occurred during defense.

A majority of the injuries were contact injuries (42/64). The most frequently occurring amongst contact injuries were contact with the ball (n=27), followed by contact with the frame (n=8) and contact with an opponent (n=5). One of the injuries occurred during double contact, in this case contact occurred with the ball and an opponent at the same time. One player injured himself or herself in connection with contact with a teammate. There was no significant difference between

women and men in terms of whether an injury was due to contact or not. 79% of the players that had received contact injuries reported that they would return within one month (31/39). Of the players that received non-contact injuries, 50% came back within one month (11/22). A difference that was significant ($p < 0.05$). There was no significant difference when comparing contact injuries to other types of injuries in terms of the number of players that made a full recovery and the number of players that had a short absence. See table 7-8 and table appendix, tables 3.21-3.23. A clear majority of finger injuries occurred in connection with ball contact (21/24). Contact injuries were not as common when it came to injured feet and ankles (7/20). Five of these occurred in connection with contact with the frame, one because of contact with the ball and one due to contact with an opponent.

Table 7 Frequency description for injury mechanisms

	Number		
	Women	Men	Total
Attack (N=66)			
Yes	7	16	23
No	18	25	43
Total	25	41	66
Defence (N=66)			
Yes	12	22	34
No	13	19	32
Total	25	41	66
Contact injury (N=64)			
Yes	12	30	42
No	11	11	22
Total	23	41	64
Ball	10	17	27
Opponent	1	4	5
Teammate	0	1	1
Frame	1	7	8
Double contact*	0	1	1
Total	12	30	42

* the double contact involved contact with the ball and an opponent at the same time

Table 8 Length of absence in relation to injury mechanisms

	Number			
	Short absence ≤ 3 days	Medium absence 4-30 days	Long absence ≥ 1 month	Total
Phase of play (N=63)				
Attack	4	10	9	23
Defence	13	11	7	31
Other	0	6	3	9
Total	17	27	19	63
Contact injury (N=61)				
Yes	14	17	8	39
No	3	8	11	22
Total	17	25	19	61
Type of Contact injury (N=39)				
Ball	9	11	5	25
Frame	3	3	2	8
Opponent	2	1	1	4
Teammate	0	1	0	1
Double contact*	0	1	0	1
Total	14	17	8	39

* the double contact involved contact with the ball and an opponent at the same time

Most common & most serious occurring injuries

The most common diagnosis was ligament problems in fingers (n=12), of which ten of the injured were men and two were women. One thing that all of these injuries had in common was that they were contact injuries. Eleven occurred in connection with contact with the ball (of which one was a double contact injury involving an opponent at the same time), while one occurred solely in connection with contact with an opponent. Most of these injuries (9/12) occurred during defensive play and only two during attacking play. For four of these players it was a part of the body that was known to be weakened since previously. For 11 of the injuries the length of absences were reported. Five of those reported that they would return within 3 days and a further four that they would be back within one month.

The second most common diagnosis was ligament injuries in the ankle (n=9). Eight of the injured were men and one was a woman. None of these players reported that it was a part of the body that was known to be weakened since previously. Four were contact injuries (2 frame, 1 ball, 1 opponent). Six of the injuries occurred indoors and three on sand. Four of the injuries occurred during attacking play and the same number occurred during defensive play. All of them had reported the length of absences. Four players reported that they would be back within three days and a further three that they would return within one month.

Knee injuries formed the group that contained the largest percentage of long time injuries. Four men and two women suffered knee injuries. Two meniscus injuries and three ligament injuries resulted in an absence of longer than one month, while one player could return within a month. One of injuries occurred in connection with contact with an opponent and one in connection with contact with the frame. Four of the injuries occurred during attacking play and one of the injuries occurred during defensive play. Five of the injuries occurred indoors. None of the injuries were reported to be due to over exertion, but for one of the players it was known to be a weakened body part since previously.

DISCUSSION

The purpose of this project was to analyse the injury situation within tchoukball. The definition of an injury was not objectively defined but was based upon that which was deemed to be a problem for the tchoukball players. There was however requirement that the injury must occur in connection with the playing of tchoukball. The advantage with this method of definition is that it is precisely that which is deemed to be a problem for players, that is included in the investigation. On the other hand it is more difficult to make comparisons with other studies. For question 2.4 (experience), 2.5 (time spent playing during the preceeding seven days) and 3.3 (length of absence), the answer alternatives overlapped each other either completely or partly. In order to analyse these questions the answers were grouped together in an attempt to minimise the uncertainty that arose due to the answer alternatives not being mutually exclusive. One problem with the formulation of the tchoukball investigation is that there is no measure of the degree of reporting; which can vary depending on different factors, meaning that commonly occurring events in this material are not necessarily representative of the injury situation within tchoukball as a whole. One way to eliminate certain types of reporting bias in the future is to have somewhat clearer definitions of what an injury is, in order that (for instance) less serious injuries are reported to the same degree as serious injuries. Nor does there exist any measure of how well known it is among tchoukball players that the opportunity to report about eventual injuries exists. Judging from the material received this fact is more well known in Switzerland than elsewhere, alternatively the players in that country are more motivated to report about their injuries. It is also difficult to determine to what degree this study is representative of tchoukball in general. That is why a literature study also occurred within this project. The results from the tchoukball investigation were placed in relation to earlier research done within (primarily) handball and volleyball. Further studies are required in order to both verify the results from this study and explore new areas that have not been highlighted in this study.

The model developed by Meeuwisses et al is the structure that has been used in order to analyse the injuries. This model is however not optimum for analysing injuries due to over exertion, since the model does not take account of the teams' training patterns and competition schedules. In the case of injuries due to over exertion, the initiating event is often not a direct occurrence but rather a relationship to the most recent time's training and competition schedule. Additionally it was only a few of the tchoukball reports that concerned injuries caused by over exertion. Because of this there exists only a description of these injuries but no detailed analysis.

All articles that exist concerning volleyball injuries, handball injuries and preventative measures have not been included and analysed in the literature study. This could mean that findings that are included in this report and that appear to form a clear trend, may only be so within a small number of studies. An attempt has been made to reduce the risk for this to a minimum by performing a general analysis of more articles than just those that are presented in this study. This has been done in order to gain a wider appreciation of the discussions within these areas. One of the problems that exist when comparing different studies with each other is that there is no single commonly accepted definition of injury.

Incidence of injury

The results from the literature study showed a total incidence level for injuries within volleyball of 2.3-3.8 injuries/ 1000 playing hours. For matches it was between 3.5-4.1/ 1000 playing hours and for training between 1.5-1.8/ 1000 playing hours. This pattern of a higher level of incidence during matches in comparison to training can also be found within the handball studies; which show a level of incidence during training of 0.6-4.3 injuries/ 1000 playing hours compared with 8.9-14.3/ 1000 playing hours during matches. The level of incidence for injuries during handball

training was generally at the same level or slightly higher than that for volleyball. When it comes to matches the incidence level was clearly higher within handball. In the analysis of matches during the Olympic games it was shown that the risk for injury within handball was much higher than within volleyball. It seems that there was typically a higher risk of injury during a handball match than during a volleyball match. On the other hand it may well be so that the risk for injury during training is very similar within both sports. The Olympic study illustrated that a larger percentage of the injuries within volleyball led to an absence (83%) in comparison with injuries within handball (38%). It was evidenced in the tchoukball study that the percentage of injuries that led to absence was at the same level as for the Olympic tournament in volleyball (86%). The design of the tchoukball study was constructed in order to obtain a picture of the injury panorama. It did not, however, provide any possibilities to calculate the level of incidence for injury. The design of tchoukball as a sport is in some ways reminiscent of handball and volleyball. It is therefore very possible to believe that the sport of tchoukball places the same sort of strain on the body as both of these sports. It is therefore also very possible that the level of incidence for injury within tchoukball is at the same level as for handball and volleyball. This seems particularly relevant concerning training since the difference in the risk of injury during training does not seem to be that great between handball and volleyball. On the other hand it is much more difficult to judge what type of eventual increased risk for injury the playing of matches involves for tchoukball players. The reports from tchoukball players were evenly divided between training and matches. This however does not necessarily mean that the risk of being injured during a match is around the same level as for training. The degree of reporting can have been different for matches and training. And since there is a clear increase in the risk of injury during matches within other sports it is also likely that this is also the case within tchoukball.

Degree of seriousness

The entire spectrum of length of absence was represented in the tchoukball material, from those injuries that did not result in an absence at all, to injuries that meant that the players were expected to be absent for more than a month. This indicates that players are not just reporting on a certain type of injury. As to the question of how representative the spread of length of absence displayed in this study is for tchoukball in general, this is difficult to determine since the degree of reporting can have varied depending on the degree of seriousness of injury. Most common (43%) were injuries that resulted in medium absence (4-30 days). The group that experienced short absence (≤ 3 days) was approximately the same size as the group that had long absence (≥ 1 month). The typical length of absence after volleyball injuries was a few weeks. This is to a certain degree reminiscent of the pattern of absence caused by tchoukball injuries, with the most common being medium or long absence. For the players in the Olympic volleyball tournament it was difficult to draw any conclusions since relevant data was missing for many players. In the Olympic handball tournament a clear majority came back within a week while 8% were absent due to injury for more than four weeks. It is however difficult to compare Olympic handball players with volleyball-playing youths. There are many aspects, in addition to the actual injuries, that affect the length of absence. Motivation and pressure to make an early return as well as the resources available for rehabilitation all play a role. Additionally the need for a longer period of time prior to returning to play is not always significant of a more serious injury. It can also depend upon the way in which the return-to-play boundary is managed e.g. if players are allowed to return as soon as they are able to play or if the process is optimised in order to reduce the risk for further injury.

The typical mild type of injury within tchoukball (that resulted in short absence) was bruising, which in all cases caused a short absence. Even sores were in many cases of the mild variety with a short absence as a result (3/7). Within the group containing mild injuries we could also find head injuries, of which more than half (4/7) involved nothing other than a short absence. De-

spite this fact it is however vital not to underestimate the degree of seriousness of head injuries at an early stage since head injuries can be serious.

Risk factors

In the tchoukball investigation both internal and external risk factors were analysed. Age, gender, experience and previous problems involving that part of the body affected by the injury were examples of the internal factors. The external factors that were measured were occasion (match or training), level, surface, amount of play during the preceding week and at what point in time during the playing occasion that the injury occurred.

Internal factors

In general within sports the level of incidence for injury is often higher for men than for women. Typically in the handball and volleyball studies, however, there were no significant differences found with regards to gender. In the tchoukball investigation no significant differences between men and women were found with regards to the degree of seriousness of the injuries. On the other hand there were nearly twice as many men represented as women. This may be because there are fewer women playing tchoukball or because less serious injuries were not reported as often by women. Of the nine injuries that did not result in absence (< 1 day), men were affected by eight of them. When it came to medium absence, however, there was approximately the same number of women as men. If it is the case that men have a higher degree of reporting than women then it is vital to do something to fix this problem, as it is by no means certain that the injury mechanisms are the same for female players as for their male counterparts. When the material mostly consists of reports from men there is a risk that the pattern for female players will not be made visible. This can also be to the disadvantage of male players since there are lessons to be contributed by both groups. A problem that receives a lot of attention within many sports is that women run a higher risk of suffering knee injuries that can develop into osteoarthritis later in life. Based on the literature study this does not seem to occur within volleyball. Of the knee injuries that were reported within tchoukball, four affected men and two affected women. There was in other words no evidence in this material that knee injuries were more common for women. Based on this investigation it is however not possible to rule out the fact that women within tchoukball may have a higher risk compared to men. This area is therefore important to continue to explore.

Within many ball sports a previous injury carries with it an increased risk for new injury. This could be clearly seen in the volleyball studies, which showed that there was increased risk for ankle sprains, especially within the first year after an injury. For tchoukball players there did not appear to be any significant difference in the degree of seriousness because of an earlier problem with the part of the body that had now been injured. However since there is a strong trend within many other sports, and because injuries involve a weakening effect (temporary or permanent), it is highly likely that an increased risk also exists within tchoukball.

That the larger part of sports injuries affect the group between 10-34 years can be explained by the fact that this group plays sport to a greater extent than others. Olsen et al did not find any significant differences in the level of incidence when youths were compared with seniors. In the tchoukball study there was a relationship between age and length of absence, in that the group with players older than 30 years a greater share of long absences (50%) compared with the younger group (23%). This can depend upon a slower healing process for older people. But it is not possible to exclude another possible explanation, namely that older players take greater risks. It is difficult to determine if it also has to do with a difference in the level of incidence. It is conceivable that older players have more experience and that this is the underlying cause of the difference between the age groups. Length of experience did not make any significant difference in

the degree of seriousness. That indicates that it could be age itself that contributes to a longer period of absence.

External risk factors

Within tchoukball it was clear that most players injured on sand were able to return within a month (12/13) while the corresponding number was lower for injuries received indoors (32/50). The material concerning injuries on sand was however not as large as for that regarding indoor injuries, and it is conceivable that a more even result would be found if based on the same number of reports from the different surfaces. Since there is no level of incidence for injury from the various surfaces available, it is not possible to compare the total number of injuries with each other. It could be so that the frequency of injury is much higher on sand and as a consequence, the percentage of injuries that are serious is lower even though the total number of serious injuries is at the same level as for indoor injuries. If it now happens to be so that beach-tchoukball has a lower incidence of injuries that cause long absence, it is interesting to continue to explore this in order to see if it is the surface itself that is the reason or if it depends on some other factor. The type of surface is not the only difference between beach-tchoukball and the indoor variety. Tchoukball players who play on sand are often without shoes. In the study by Parkkari et al (2000) a theory was described that shoes disrupt the tactile feeling in the foot. If one follows this line of thinking then barefoot play could be able to produce a reduction in the degree of seriousness. Another difference is that there are fewer players on the field during beach-tchoukball. Furthermore the beach form of the sport has not existed as long, which means that it has not had as much time to develop. Another thought is that there can be different types of mentalities involved that lead to somewhat different types of injuries in terms of the degree of seriousness. Further studies into this area are needed in order to investigate the importance of the surface type in relation to the level of incidence for injury and the degree of seriousness.

Amongst those injured during the first half hour of tchoukball play, 48% came back within 30 days, while the corresponding number for those that were injured later than during the first half hour and that returned within 30 days was 84%. What this depended upon is difficult to say. It is conceivable that those who injured themselves during the early period of play had not managed to warm up as effectively and that this could have contributed to the injury being of a more seriousness nature. Such a line of thinking could not be found in any literature. In the handball study performed by Junge et al (2006) there was no significant difference in the spread of injuries that occurred during the first half in comparison with the second half. These findings indicate that there is no increased risk due to the longer time one has played (at least not when it comes to the first hour). This is of interest for discussions about what the optimum length of time for a match is in relation to the level of incidence for injury and the degree of seriousness.

Playing level or how much tchoukball one had played during the preceding seven days did not seem to have any effect on the degree of seriousness of injuries within tchoukball.

Summary

Based on the literature study it can be assumed that those players that had been injured previously (especially during the preceding year) run increased risk of injury. They therefore form a given target group for preventative measures aimed at eliminating further injury. Another group that should receive extra attention is players over 30 years of age since they, according to the tchoukball study, have an increased percentage of long-term injuries. The results of the literature study and the tchoukball investigation don't seem to suggest that longer playing time implies greater risk. In order to establish if the match times within tchoukball are optimum or should be altered in order to minimise injury risks, more detailed investigations must be performed. The

same applies for the importance of the playing surface in relation to injuries. To which end a deeper analysis of indoor tchoukball in comparison with beach-tchoukball would be interesting.

The injury mechanism

In the evaluation of tchoukball injuries there were two aspects that were analysed. These were the phase of play and whether the injuries were caused by contact or not.

Tchoukball was created in order to minimise the aggressive contact between players that can lead to injuries. There did however occur injuries in connection with contact with opponents. These accounted for 9% of all injuries and 14% of all contact injuries. It is interesting to compare tchoukball with volleyball (which is described as a non-contact sport). Within volleyball both teams are positioned on their own half of the court with a net between them. Volleyball is, despite this, not free from contact injuries. It was shown in many studies that the main mechanism for ankle sprains was contact with teammates or opponents. Handball is more known as a contact sport. In those studies where it was specified what had caused contact, it seemed that contact with an opponent had caused more than half of the injuries. Numbers that were higher than those that occurred within tchoukball. Within tchoukball it was instead contact with the ball that primarily caused injuries. Most of the injuries caused by contact with the ball affected the fingers (75%). For tchoukball the pattern of injury was not the same for various types of contact injuries. Those injuries that occurred in connection with contact with the frame affected primarily the feet and ankles. Injuries caused by either contact with teammates or contacts involving several objects simultaneously were very uncommon within tchoukball. When it came to those injured because of contact a greater percentage returned within a month (79%) than in comparison to those who suffered non-contact injuries, of which half were back within a month. Exactly what causes injuries that do not involve any type of contact is difficult to say. It would be interesting to study this in more detail since there were indications that these injuries often result in more serious consequences. In the frequency description of the different types of contact injuries both men and women had a large percentage of injuries in connection with ball contact; while injuries due to contact with opponents or the frame were more typical for men. If these are differences that are representative for tchoukball in general it could mean that preventative measures for men and preventative measures for women should be designed to a certain extent in different ways.

Most of the injuries to tchoukball players occurred during defensive play, as opposed to the handball study by Olsen et al (2006) in which the majority of injuries occurred during attacking play. On the other hand the tchoukball study indicated that injuries occurring during defensive play were milder than those occurring during attacking play. 42% of those injured during defensive play were back within 3 days, while the comparative figure for those injured during attacking play was 17%. Of those injured during defensive play, 77% came back within 30 days as compared with 61% of those injured during attacking play. (The differences were not significant when it came to the percentage of injuries that resulted in long absence).

It is important to achieve a good understanding of the injury mechanism in order to be able to do something about the situations that lead to injury. Either through changing the rules or influencing training within the sport in question so that the players can handle the riskfilled situations better. This is therefore a vital area for future studies, since every sport has its own injury panorama. It is possible to make comparisons between different sports, but research must also occur within the specific sport in question.

Injuries due to fatigue

Most of the injuries caused by fatigue were some type of muscle or tendon injury. Half of these injuries resulted in long absence and half in medium absence. Four of those injured were re-

ported to have made a full recovery while two said that they had some type of remaining problem. A majority of those injured were women but it is not possible to determine if this is something that applies to Tchoukball generally or if it was an occurrence specific to this material.

Frequently occurring injuries

It was shown by the literature study that injuries to the lower extremities were the most common amongst volleyball players and handball players. Injured ankle ligaments were the most common diagnosis. Within Tchoukball the number of finger injuries was at the same level as the number of ankle injuries. The two most common diagnoses were ligament problems in fingers and ankles.

Typical characteristics for the finger injuries were that they occurred in defensive play (72%) and in connection with ball contact (88%). This was even clearer when it came to an analysis of finger sprains, of which 92% occurred during contact with the ball and 75% during defensive play. Finger injuries were the most common category of injury. In studies into handball and volleyball the percentage of finger injuries was not as great. One explanation was that finger injuries did not result in absence to any great extent. In the Tchoukball study it was however shown that the absences resulting from finger injuries demonstrated the same patterns as for absences due to ankle and foot injuries, whereby 30% of the injured came back within 3 days and between 26-30% had a long absence. If this means that finger injuries within Tchoukball are generally more serious than those occurring within other sports is difficult to determine. As has been pointed out previously, it is not only the injury itself that affects the length of absence; other factors such as the rehabilitation strategy and motivation also affect the length of absence. The results do however suggest that finger injuries within Tchoukball should not be underestimated since they occurred at the same level as foot/ankle injuries both in terms of number and the degree of seriousness. Within Tchoukball it is recommended that the ball pressure should be high in order to minimise finger injuries during defensive play. Having an optimum ball pressure as a preventative measure is something that can even be recommended in the future. There is not as much existing research into finger injuries as for ankle/foot injuries. What was shown was that after a finger sprain it was important to give the injured finger extra biomechanical support through, for instance, taping it to another finger or to a splint. This should only be done during the time that the injury is healing, since a longer period of taping can instead lead to a weakening of the finger joints. It is very likely that the use of technique training as a preventative measure has a vital role to play.

The second most common type of injury within Tchoukball was to the ankle/foot (30%). And even here it was damage to the ligaments that occurred most often. When it came to those who suffered foot injuries, 30% returned within 3 days, 40% had medium absence and 30% were absent for a month or longer. As opposed to finger injuries, foot injuries occurred more often during attacking play (10/20) than during defensive play (5/20). Contact injuries accounted for 35% of all foot injuries; of which contact with the frame was the most common (5/7). None of the players who injured their ankle ligaments reported that this was a body part that had been weakened prior to the injury. When attempting to prevent ankle injuries an effective warming up program can cause a reduction in the number of injuries that affect the feet. For players with unstable ankles the use of semi-rigid protection is a very effective preventative measure. Even regular training for the ankles with use of a platform can reduce the number of ankle injuries.

Knee injuries

Knee injuries did not occur as often, but those that did occur were of a more serious nature. The parts of the knee that received the damage were primarily ligaments and meniscus. Contact was not as obvious in those situations that led to knee injuries. Most of these injuries occurred during attacking play. The exact injury mechanism is not disclosed, but this would be interesting to explore further. In this material there was no overrepresentation of women. It can however not be

ruled out that women run a higher risk than men, as is the case within handball. Even for knee injuries a structured warming up program can reduce the number of injuries to knees, as well as the regular practice of ankle training with a platform.

General preventative measures

General measures to reduce the number of sports injuries include the taking of the Preparticipation Exam (PPE) by all who wish to participate in a sporting activity. Warming up and warming down are also recommended; however there is thus far no clear proof that stretching reduces the frequency of injury. Another vital component can be not returning to play too soon after an injury. The importance of fair play has been emphasised in many articles. It is therefore reasonable to assume that the philosophy that tchoukball is based on, emphasising respect for one's self and each other, is positive when it comes to minimising the frequency of injury. This should be a vital part of tchoukball even in the future. The importance of the way one thinks in terms of reducing injury risk was also shown in those studies about cognitive behavioural interventions and different preventative programs in which risk reduction was achieved to a certain extent through an increased consciousness. It does however appear to be important that such consciousness is built upon a deep knowledge since instruction/demonstration alone did not seem to contribute to a reduction of injury risk.

The future

Continuing to collect injury reports from tchoukball players is a relatively simple way to increase knowledge about the injuries that occur within tchoukball. It is important to try to increase the attention paid to this injury report and the motivation to use it after an injury. It is therefore vital to make extra efforts aimed at those groups that thus far have not known about the report or not had the motivation to use it. There are certain small changes that should be made within the report. One is that the answer alternatives for questions 2.4, 2.5 and 3.3 should be formulated in such a way that there is no overlapping. The instructions for answering question 3.6 should be altered in order to avoid misunderstanding for those who fill in the report and later for those who shall interpret the report. In future studies it would be of great interest to follow a tournament or competition (series) that takes place within a defined time frame; in order to be able to achieve an appreciation of the level of incidence for injury as well as eventually be able to obtain a broader picture of the types of injuries that occur with tchoukball. The study of a short tournament has the advantage that the time frame is not as long (only a few days) and is therefore easier to perform. The advantage of studying a competition (series) during an entire season is that both training and match play can be studied at the same time. Additionally the total number of injuries should be greater, which should therefore mean a broader picture of the injury panorama. These studies are not only of interest in their own right, they could also form the basis of the examination of future prevention programs or other preventative measures within tchoukball.

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Personal communication

22. Michel Thomann (Director of the FITB Technical Commission)

THE TCHOUKBALL REFEREES' CODE
OF THE INTERNATIONAL TCHOUKBALL FEDERATION (FITB)

Foreword

The present document precisely defines the rules of Tchoukball applicable in all official meetings, national and international. This new version of the rules follows from the FITB technical and refereeing committee meeting held in Neuchâtel (Switzerland) on the 31st of July 1987. The decisions taken and some of the propositions put forward on this occasion were integrated in this update of the refereeing code.

Since 1970, during which year Dr Hermann Brandt first officially introduced Tchoukball, the rules underwent several modifications. The present changes, as in the past, have been added in order to harmonise the practice of Tchoukball while taking into account the latest experiences, without however spoiling the spirit of the game's creator.

Introduction

A Tchoukball match opposes two nine-player teams on a rectangular field forty meters long by twenty meters wide. One rebound frame is placed at each end of the field. In front of each frame, a semi-circle three meters in radius defines a forbidden zone.

The ball meets the standards of the Handball game. It must never touch the ground. During any phase of the game, the ball remains in the hands of one team; interception is forbidden in order to prevent aggressions and violent physical contacts between opponents. Control of the ball is handed to the other team after every shoot at the frame or after every fault.

In order to score a point for his team, a player must bounce the ball off the frame such that no defending player can catch it before it falls on the field of play.

The team that has just conceded a point restarts the game. A maximum of three passes is allowed to put one player in a favourable position to shoot. Defending players are not allowed to interfere this preparation, but they must anticipate in order not to be surprised by the ball's trajectory when it bounces from the frame. At the end of the allotted time, the team with the most points wins the match.

Outside of competition, it will often prove necessary to adapt the rules to the number of available players, to their level of preparedness, or to the size of the playing field. The flexibility of Tchoukball makes it a sport accessible to all by allowing a great freedom of action. However, any modification must follow a reflection on its educative, physiological, and psychosocial impact. This caution is absolutely indispensable in order not to lose any of the advantages provided by the scientific design of Tchoukball.

Rule 1***The Playing Area***

- 1.1 The recommended playing area is a 40m x 20m rectangle; it consists of a field of play and two forbidden zones.
- 1.2 The long sides are known as the sidelines and the short lines as the base lines. The playing area is divided into two zones by a median line joining the midpoints of the sidelines.
- 1.3 The "forbidden" zone is a semi-circle, with a 3m radius measured from the centre of each base line.
- 1.4 The front base of the frame is positioned in the middle of the diameter of this zone.
- 1.5.1 The lines should be clearly visible and with a width of 5 cm.
- 1.5.2 All lines are part of the area they delimit: The sidelines and the base lines belong to the field of play. The lines of the forbidden zone (semi-circle and diameter) belong to this area.
- 1.6 In sports halls, the ceiling or sport engines higher than 7m are considered as out of the playing area.
- 1.7 A 2 meter wide unobstructed area around the playing area is recommended.

Rule 2***The Frame***

- 2.1 The frame and the net size, the inclination between the frame and the ground must conform to the F.I.T.B. standards.
- 2.2 The net has to be sufficiently taut.
- 2.3 The frame must be fixed during the play in a way that cannot endanger the players.
- 2.4 The frame has to be officially approved by the F.I.T.B.

Rule 3***The Ball***

- 3.1 The ball must be round, with a leather covering and a rubber bladder.
- 3.2 In men's matches, the ball must have a circumference of 58 to 60cm and weigh 425 to 475 grams.
- 3.3 In women's and junior matches the ball must have a circumference of 54 to 56 cm and weigh 325 to 400 grams.
- 3.4 In mixed matches the ball will meet the standards used for women's and junior matches.

Rule 4***The Players***

- 4.1 A squad can be made up of up to 15 players; but in any given match, only 12 may be on the match sheet.
- 4.2 Of the 12 players, only 9 can play simultaneously at any given time, the remaining 3 act as substitutes.
- 4.3.1 Substitution will take place in front of the scorekeeper's table or in front of the team benches, within 5m on each side of the median line, without stopping the game.
- 4.3.2 A wounded player can be replaced as soon as he is out of the playing field.

- 4.3.3** Substitution can take place only if a point has been scored.
- 4.4** Players should be dressed uniformly and have a clearly visible number from 5 to 20.
- 4.5** Players are to wear sports shoes without studs. On grass or other soft surfaces, sports shoes with rubber-ridged soles are authorised.
- 4.6** It is forbidden to wear any jewellery, (whether ring, broach, watch, earrings...)

Rule 5

The Referees

- 5.1** The refereeing body for international matches shall comprise 3 persons, of whom one is to be responsible for the scoring and time keeping.
- 5.2** The referees control the game according to the rules.
- 5.3** The scorekeeper notes the results, deliberate offences, foul play; he checks that substitutions and engagement are correctly made. He gets the match-sheet to be signed.
- 5.4** The referee's outfit is clearly different from the players' outfit. They have at their disposition a whistle, yellow cards (warning), and red cards (expulsion).

Rule 6

The Duration of the Matches

- 6.1** The duration of the men's matches shall be three periods of 15 minutes, with a maximum interval of 5 minutes between periods.
- 6.2** The duration of the women's and junior matches shall be three periods of 12 minutes, which a maximum interval of 5 minutes between periods.
- 6.3** The duration of the junior matches (less than 16 year-old players) shall be three periods of 10 minutes, with a maximum interval of 5 minutes between periods.
- 6.4** The referee shall decide when the stopwatch is to be stopped and restarted (in case of injury...).
- 6.5** Upon the final blast of whistle, the game ends at once: consequently, any ongoing action shall be declared null.

Rule 7

The Faults

- 7.1** A player commits a fault if:
- 7.1.1** he touches the ball with his leg;
- 7.1.2** he makes more than 3 contacts with the feet on the ground whilst holding the ball (receiving the ball with one or two feet on the ground counts as one contact);
- 7.1.3** he holds the ball for more than 3 seconds;
- 7.1.4** he makes a pass that takes the team count of successive passes over 3 (a deviation of the ball is considered as a pass);
- 7.1.5** he touches any area outside of the field of play while holding the ball;
- 7.1.6** he drops the ball during a pass;
- 7.1.7** he obstructs the movement of an opponent about to receive the ball, shoot, pass, position himself...
- 7.1.8** he shoots at the frame on which 3 consecutive shots have already been made (a breakdown or point scored returns the count to zero);
- 7.1.9** he touches the ball rebounding from the net after a team mate shot and the ball falls down into the field of play;
- 7.1.10** he makes contact with the forbidden zone before he has thrown the ball;

- 7.1.11 he goes through the forbidden zone to take a defensive position;
- 7.1.12 he shoots, after an engagement, before the ball has crossed the median line;
- 7.1.13 he enters the ground, upon substitution, before his teammate has come out.
- 7.2 A fault is penalised by a breakdown in favour of the adverse team. The referee is to ensure that the free throw is taken from where the fault occurred. At least one pass must be made before shooting at the frame. The referee has to check that the ball is rolled (and not thrown) to the place of free throw.

Rule 8

The Awarding of Points

- 8.1 A player scores a point if the ball rebounding from the frame:
 - 8.1.1 touches the field of play before a defender can catch it;
 - 8.1.2 touches a defender who fails to control it by dropping it on the floor or knocking it out of play;
 - 8.1.3 touches a defender on his legs (rule 7.1.1).
- 8.2 A player concedes a point if:
 - 8.2.1 he shoots and misses the frame;
 - 8.2.2 the ball rebounding from the net, after a shot, falls out of play or into the forbidden zone;
 - 8.2.3 he shoots and the ball rebounds onto him.
 - 8.2.4 he touches the ball having a contact with the forbidden zone or being outside of the playing area after a teammate shot.
 - 8.2.5 he deflects the rebounding ball into the forbidden zone or out of the play after a teammate shot;
 - 8.2.6 he deliberately touches the ball, preventing it from falling out of play or into the forbidden zone. He has committed an intentional foul.
 - 8.2.7 while trying to catch the ball, he steps into the forbidden zone or out of the playing area.
- 8.3 The team that has the highest score at the end of the conventional time is the winner.

Rule 9

Starting and Restarting the Play

- 9.1 At the beginning of the match, the team who gets the ball is chosen by lots. At the start of the second period, it is the other team's turn. At the beginning of the third period, the ball is in the hands of the losing team (in case of an even score, of the team who started the match).
- 9.2 the team that has conceded a point restarts the game.
- 9.3.1 The restart shall take place behind the base line and beside the frame on which the last point was scored. If there is not enough space in the referee's opinion, the restart can take place from inside the forbidden zone.
- 9.3.2 If rule 9.3.1. is not respected or if the ball leaves the playing area, the adverse team is awarded a restart.
- 9.4.1 Following the restart, the first shot may be on either frame provided the ball has crossed the median line
- 9.4.2 The ball is considered to have crossed the median line if the catcher has his feet clearly on the far side of the median line
- 9.4.3 One or more pass is allowed before the ball crosses the median line.
- 9.5 The restart does not count as a pass.

Rule 10**Faulty Bounce**

- 10.1** A faulty bounce occurs when:
- 10.1.1** the ball touches the metal edge of the frame;
 - 10.1.2** the rebounding ball does not respect the mirror image as a result of hitting the frame's rubber bands or clips.
- 10.2** If a defending team successfully catches a faulty bounce, the game goes on. If, on the other hand, it fails to control the ball, the game stops and the defending team is given a free throw from the spot where the ball did fall.
- 10.3** Rules 8.2.2 to 8.2.6 remain in effect even after a faulty bounce.

Rule 11**Behaviour towards Opponents, Referees and Public**

- 11.1** Each player, referee, coach or manager must respect the Tchoukball Charter.
- 11.2** A player who violates the spirit of the game through disrespectful behaviour towards an opponent, a referee, a spectator or a teammate will receive a warning from the referee (yellow card), who can also, if he deems it necessary, expel the player.
- 11.3** An expelled player may be replaced.
- 11.4** Warnings and expulsions are noted on the match sheet.

International tchoukball federation (FITB) - Injury report

The information provided is for medical and research purposes and will be treated confidentially
Please fill in a separate report for each injury. **Please answer in English.**

1. Information on the match or training session 1.1 Date (dd.mm.yy): _____ 1.2 Town / City : _____ Country: _____ 1.3 Name of the team (club, national team): _____ 1.4 Type of event: <input type="checkbox"/> Match <input type="checkbox"/> Training 1.5 Level: <input type="checkbox"/> Beginners <input type="checkbox"/> Regional <input type="checkbox"/> National <input type="checkbox"/> International 1.6 Field: <input type="checkbox"/> Indoor <input type="checkbox"/> Grass <input type="checkbox"/> Sand <input type="checkbox"/> Concrete <input type="checkbox"/> Other: _____
2. Information on the injured player 2.1 Age: _____ 2.2 Sex: <input type="checkbox"/> Female <input type="checkbox"/> Male 2.3 Hand: <input type="checkbox"/> Right-handed <input type="checkbox"/> Left-handed 2.4 Tchoukball player for: <input type="checkbox"/> less than 2 months <input type="checkbox"/> between 2 and 6 months <input type="checkbox"/> between 6 months and 1 year <input type="checkbox"/> between 1 and 3 years <input type="checkbox"/> between 3 and 6 years <input type="checkbox"/> more than 6 years 2.5 Number of hours of tchoukball played during the last 7 days: <input type="checkbox"/> 0-2 hours <input type="checkbox"/> 2-4 hours <input type="checkbox"/> 4-8 hours <input type="checkbox"/> 8-12 hours <input type="checkbox"/> more than 12 hours 2.6 Number of minutes of tchoukball during the match/training at the time when the injury occurred: _____ 2.7 Special equipment related to the injury (shoes? finger tape? kneepad?): _____
3. Information on the injury 3.1 Location (injured body part): _____ 3.2 Diagnosis (if possible): _____ 3.3 Severity (absence of tchoukball field in days): <input type="checkbox"/> less than 1 day <input type="checkbox"/> 1 to 3 days <input type="checkbox"/> 4 to 7 days <input type="checkbox"/> 7 to 30 days <input type="checkbox"/> 1 to 3 months <input type="checkbox"/> > 3 months 3.4 Was the injured body part naturally a weak body part for the player: <input type="checkbox"/> yes <input type="checkbox"/> no 3.5 Circumstances: <input type="checkbox"/> Attack <input type="checkbox"/> Defense <input type="checkbox"/> Other: _____ <input type="checkbox"/> The injury is not due to a given action, but results from intensive tchoukball playing during several months/years (fatigue, etc.) 3.6 Please answer "yes" to the 3 next questions only if this contact caused the injury Contact with a teammate: <input type="checkbox"/> yes <input type="checkbox"/> no Contact with an adversary: <input type="checkbox"/> yes <input type="checkbox"/> no Contact with the ball: <input type="checkbox"/> yes <input type="checkbox"/> no Contact with the frame/net: <input type="checkbox"/> yes <input type="checkbox"/> no 3.7 Recoverable injury? <input type="checkbox"/> yes, totally <input type="checkbox"/> yes, partially <input type="checkbox"/> no, no more tchoukball 3.8 Other information about the accident: _____
4. Contact In case the FITB would need more information about the reported injury, please provide a name, phone number and email of an english-speaking person First Name: _____ Last Name: _____ Phone number: _____ Email: _____

Please return this report to: FITB, Michel Thomann, 5 ch. du Platane, CH-1008 Prilly, Switzerland
fax: +41 22 368 00 28, email: michel.thomann@tchoukball.org

Table 3.1 Frequency description of reporting year and players' home countries

	Number	%
Year		
2003	1	1
2004	19	29
2005	25	38
2006	19	29
No reply	2	3
Total	66	100
Countries		
Belgium	2	3
Brazil	1	2
France	3	4
Japan	1	2
Canada	1	2
Switzerland	51	76
Singapore	1	2
Great Britain	3	4
Austria	1	2
No reply	2	3
Total	66	100

Table 3.2 Frequency description of age groups

	Number	%
Age group (years)		
11-15	7	11
16-20	10	15
21-25	17	26
26-30	16	24
31-35	8	12
36-40	5	8
41-45	3	4
Total	66	100

Table 3.3 Frequency description of type of injury and location on body

	Number		Total
	Women	Men	
Body part (N=66)			
Ankle-Foot	6	14	20
Finger	8	17	25
Knee	2	4	6
Head	4	3	7
Other part of body	5	3	8
Total	25	41	66
Type of injury (N=64)			
Fracture	3	5	8
Joint (non-bone) and ligament			
Ligament	5	21	26
Meniscus and cartilage	0	2	2
Muscle and tendon			
Muscle injury	2	1	3
Tendon injury	5	1	6
Bruise	1	2	3
Sore	1	6	7
CNS/PNS	1	0	1
Other	5	3	8
Total	23	41	64

Table 3.4 Cross table for short absence compared with medium-long absence

	Number		Total
	≤3 days	≥4 days	
Gender (N=63)			
Women	4	19	23
Men	13	27	40
Total	17	46	63

Table 3.5 Cross table for short-medium absence compared with long absence

	Number		Total
	≤30 days	≥1 month	
Gender (N=63)			
Women	17	6	23
Men	27	13	40
Total	44	19	63

Table 3.6 Frequency description of short absence compared with medium-long absence in relation to location and type of injury

	≤ 3 days	Number ≥ 4 days	Total
Body part (N=63)			
Ankle-Foot	6	14	20
Finger	7	16	23
Knee	0	6	6
Head	4	3	7
Other body part	0	7	7
Total	17	46	63
Injury type (N=62)			
Fracture	0	8	8
Joint (non-bone) and ligament			
Ligament	9	15	24
Meniscus and cartilage	0	2	2
Muscle and tendon			
Muscle injury	0	3	3
Tendon injury	0	6	6
Bruise	3	0	3
Sore	3	4	7
CNS/PNS	1	0	1
Other	1	7	8
Total	17	45	62

Table 3.7 Frequency description of short-medium absence compared with long absence in relation to location and type of injury

	≤ 30 days	Number ≥ 1 month	Total
Body part (N=63)			
Ankle-Foot	14	6	20
Finger	17	6	23
Knee	1	5	6
Head	7	0	7
Other body part	5	2	7
Total	44	19	63
Injury type (N=62)			
Fracture	5	3	8
Joint (non-bone) and ligament			
Ligament	16	8	24
Meniscus and cartilage	0	2	2
Muscle and tendon			
Muscle injury	2	1	3
Tendon injury	3	3	6
Bruise	3	0	3
Sore	7	0	7
CNS/PNS	1	0	1
Other	6	2	8
Total	43	19	62

Table 3.8 Frequency description of recovery in relation to location and type of injury

	Complete recovery	Number Remaining problem	Total
Body part (N=63)			
Ankle-Foot	16	3	19
Finger	21	3	24
Knee	2	4	6
Head	7	0	7
Other body part	6	1	7
Total	52	11	63
Injury type (N=63)			
Fracture	6	1	7
Joint (non-bone) and ligament			
Ligament	21	4	25
Meniscus and cartilage	0	2	2
Muscle and tendon			
Muscle injury	3	0	3
Tendon injury	2	3	5
Bruise	3	0	3
Sore	7	0	7
CNS/PNS	1	0	1
Other	7	1	8
Total	50	11	63

Table 3.9 Cross table for gender in relation to internal factors: experience, age group and existence of weakened body part prior to the injury

	Number		Total
	Women	Men	
Experience (N=66)			
≤6 years	17	22	39
>6 years	8	19	27
Total	25	41	66
Age group (N=66)			
≤ 30 years	21	29	50
> 30 years	4	12	16
Total	25	41	66
Weakened body part (N=66)			
Yes	7	5	12
No	18	36	54
Total	25	41	66

Table 3.10 Cross table for short absence compared with medium-long absence in relation to experience, age group and existence of weakened body part prior to the injury

	≤ 3 days	Number ≥ 4 days	Total
Experience (N=63)			
≤ 6 years	11	25	36
> 6 years	6	21	27
Total	17	46	63
Age group (N=63)			
≤ 30 years	13	34	47
> 30 years	4	12	16
Total	17	46	63
Weakened body part (N= 63)			
Yes	2	10	12
No	15	36	51
Total	17	46	63

Table 3.11 Cross table for short-medium absence compared with long absence in relation to experience, age group and existence of weakened body part prior to the injury

	≤ 30 days	Number ≥ 1 month	Total
Experience (N=63)			
≤ 6 years	26	10	36
> 6 years	18	9	27
Total	44	19	63
Age group (N=63)			
≤ 30 years	36	11	47
> 30 years	8	8	16
Total	44	19	63
Weakened body part (N= 63)			
Yes	7	5	12
No	37	14	51
Total	44	19	63

Table 3.12 Cross table for recovery in relation to experience, age group and existence of weakened body part prior to the injury

	Complete recovery	Number Remaining problem	Total
Experience (N=63)			
≤6 years	31	6	37
>6 years	21	5	26
Total	52	11	63
Age group (N=63)			
≤ 30 years	41	7	48
> 30 years	11	4	15
Total	52	11	63
Weakened body part (N=63)			
Yes	7	4	11
No	45	7	52
Total	52	11	63

Table 3.13 Cross table for gender in relation to external factors: level, occasion, playing time, surface and amount of tchoukball played during the previous week

	Number		Total
	Women	Men	
Level (N=66)			
Level 1			
Beginner	6	7	13
Regional	5	5	10
Level 2			
National	7	16	23
International	7	13	20
Total	25	41	66
Occasion (N=66)			
Match	11	22	33
Training	14	19	33
Total	25	41	66
Time played when injury occurred (N=58)			
0-30 min	10	16	26
≥31 min	13	19	32
Total	23	35	58
Surface (N=66)			
Indoor	21	30	51
Sand	4	10	14
Grass	0	1	1
Total	25	41	66
Number of hours played during previous 7 days (N=66)			
≤4	18	26	44
≥4	7	15	22
Total	25	41	66

Table 3.14 Cross table for short absence compared with medium-long absence in relation to external factors: level, occasion, playing time, surface and amount of tchoukball played during the previous week

	≤ 3 days	Number ≥ 4 days	Total
Level (N=63)			
1	7	14	21
2	10	32	42
Total	17	46	63
Occasion (N=63)			
Match	8	24	32
Training	9	22	31
Total	17	46	63
Time played when injury occurred (N=55)			
0-30 min	5	18	23
≥ 31 min	9	23	32
Total	14	41	55
Surface (N=63)			
Indoor	12	38	50
Sand or grass	5	8	13
Total	17	46	63
Number of hours played during previous 7 days (N=63)			
≤ 4	9	33	42
≥ 4	8	13	21
Total	17	46	63

Table 3.15 Cross table for short-medium absence compared with long absence in relation to external factors: level, occasion, playing time, surface and amount of tchoukball played during the previous week

	≤ 30 days	Number ≥ 1 month	Total
Level (N=63)			
1	16	5	21
2	28	14	42
Total	44	19	63
Occasion (N=63)			
Match	21	11	32
Training	23	8	31
Total	44	19	63
Time played when injury occurred (N=55)			
0-30 min	11	12	23
≥ 31 min	27	5	32
Total	38	17	55
Surface (N=63)			
Indoor	32	18	50
Sand or grass	12	1	13
Total	44	19	63
Number of hours played during previous 7 days (N=63)			
≤ 4	32	10	42
≥ 4	12	9	21
Total	44	19	63

Table 3.16 Cross table for recovery in relation to level, occasion, playing time, surface and amount of tchoukball played during the previous week

	Complete recovery	Number Remaining problem	Total
Level (N=63)			
1	18	4	22
2	34	7	41
Total	52	11	63
Occasion (N=63)			
Match	24	6	30
Training	28	5	33
Total	52	11	63
Time played when injury occurred (N=56)			
0-30 min	19	5	24
≥31 min	28	4	32
Total	47	9	56
Surface (N=63)			
Indoor	40	10	50
Sand & Grass	12	1	13
Total	52	11	63
Number of hours played during previous 7 days (N=63)			
≤4	34	8	42
≥4	18	3	21
Total	52	11	63

Table 3.17 Frequency description of injuries caused by over exertion

	Number		Total
	Women	Men	
Injury due to over exertion (N=66)			
Yes	4	2	6
No	21	39	60
Total	25	41	66

Table 3.18 Cross table for short absence compared to medium-long absence for injuries due to over exertion

	≤3 days	Number ≥4 days	Total
Injury due to over exertion (N=63)			
Yes	0	6	6
No	17	40	57
Total	17	46	63

Table 3.19 Cross table for short-medium absence compared to long absence for injuries due to over exertion

	≤ 30 days	Number ≥ 1 month	Total
Injury due to over exertion (N=63)			
Yes	3	3	6
No	41	16	57
Total	44	19	63

Table 3.20 Recovery from injuries caused by over exertion

	Complete recovery	Number Remaining problem	Total
Injury due to over exertion (N=63)			
Yes	4	2	6
No	48	9	57
Total	52	11	63

Table 3.21 Cross table for short absence compared to medium-long absence for injuries occurring in attack, in defence and through contact

	≤ 3 days	Number ≥ 4 days	Total
Attack (N=63)			
Yes	4	19	23
No	13	27	40
Total	17	46	63
Defence (N=63)			
Yes	13	18	31
No	4	28	32
Total	17	46	63
Contact injury (N=61)			
Yes	14	25	39
No	3	19	22
Total	17	44	61

Table 3.22 Cross table for short-medium absence compared to long absence for injuries occurring in attack, in defence and through contact

	Number		Total
	≤30 days	≥1 month	
Attack (N=63)			
Yes	14	9	23
No	30	10	40
Total	44	19	63
Defence (N=63)			
Yes	24	7	31
No	20	12	32
Total	44	19	63
Contact injury (N=61)			
Yes	31	8	39
No	11	11	22
Total	42	19	61

Table 3.23 Cross table for recovery from injuries occurring in attack, in defence and through contact

	Complete recovery	Number	
		Remaining problem	Total
Attack (N=63)			
Yes	17	4	21
No	35	7	42
Total	52	11	63
Defence (N=63)			
Yes	30	3	33
No	22	8	30
Total	52	11	63
Contact injury (N=61)			
Yes	34	6	40
No	16	5	21
Total	50	11	61
Type of contact injury (N=40)			
Ball	23	3	26
Opponent	3	1	4
Team mate	1	0	1
Ram	6	2	8
Double contact*	1	0	1
Total	34	6	40

* double contact means contact with the ball and contact with an opponent simultaneously