Faculty Of physical Therap
Cairo University

Cairo University

PREVALENCE AND PREDICTION RULES FOR PEDIATRIC HIP JOINT OVERUSE INJURY

Mona Mahmoud Abd El Ghany[1], Abdel Wahab M Salah[2], Samia A. Abde Rahman[2]

[1]Physical Therapist at Port Foad General Hospital, Port Foad, Egypt.
[2]Professor of Pediatric Physical Therapy, Faculty of Physical Therapy, Cairo University Egypt.

ABSTRACT

Purpose: The study was conducted to investigate the prevalence and prediction rules for hip joint overuse sports injuries among children and adolescent in karate sport.

Subjects & Methods: Fifty nine children and adolescent karate players from port-said private and public clubs and Karate schools of both sexes (45 boys and 14 girls) were enrolled in this study. The players age ranged from 8 to 18 years, with training experience in karate of at least 3 years and a training intensity of at least 3 hours/week. Their belt ranks were between (orange- black). Overuse injury questionnaire was used to collect the data required to proceed the study.

Results: The results revealed that the injury of the hip joint represents 22.7% from the total injuries the occurred to the participated Karate players with a frequency of 10 injuries per year. Regarding the prevalence of overuse injury, 59% of the players complained at least one problem at the hip joint Regression model was used to identify risk factors (age, training age, sex rank, style, training frequency/week and training time/day) for hip join overuse sports injuries. The results revealed statistically non-significan prediction (p>0.05).

Conclusion: There is a high prevalence of overuse sports injury of the hip joint among children and adolescent Karate players with no clinica prediction rules for hip joint sports injuries.

Keywords: Overuse injuries – Clinical prediction rules – Hip joint .

INTRODUCTION

Karate is one of martial arts which nowadays is included i international sports. Karate means "empty hands" and in term is a figh without using weapons against an opponent. In this sport, a fight i performed by hand and foot strikes and blocking techniques. Therefore thi sport is amongst combat sports. Injuries in this sport are divided into tw types in bouts and in practices injuries, which have different mechanisms The injury rate has been reported from 0.13 to 0.32 per competitor in eac bout. The rate of injury is different based on the injured limb and severity o injury. During bouts, most of injuries were mild and injury rates were lowe in experienced contestants. The lower limb injuries were more commo **(Halabchi et al., 2007).**

Comment [H1]: this reference is not listed in the reference section.

It seems that short duration of bout, usage of safe guards during bout presence of referee and intervening during foul moves account as preventin factors of injury incidence during bouts compared to practice. Based on thi reason, it's expected that injuries during practice are more common an qualitatively variable. Even though lack of win or lose factor and resul during practice can be a decreasing factor in incidence of injuries durin practice. A few studies have been carried out about injuries during practic and the rates of injuries have been reported. Karate is a public sport that ha athletes in various age ranges and abundant active sport clubs in Iran. I spite of that few studies have been done and these studies concentrated o competitions **(Ziaee et al., 2015).**

Comment [H2]: this reference is not listed in the reference section.

Overuse is one of the most common etiologic factors that lead to injuries in the pediatric and adolescent athlete. As more children are becoming involved in organized and recreational athletics, the incidence of overuse injuries is increasing. Many children are participating in sports year-round and sometimes on multiple teams simultaneously. This overtraining can lead to burnout, which may have a detrimental effect on the child participating in sports as a lifelong healthy activity **(Brenner, 2007).**

Overuse injuries, defined as those without a specific, identifiable event responsible for their occurrence, may be a substantial problem in many sports. They are thought to be the predominant injury type in sports that involve long and monotonous training sessions (**Clarsen et al., 2010**).

One possible explanation for the lack of knowledge on overuse injuries is that their typical presentation and characteristics make them difficult to record in epidemiological studies, when currently accepted methods of injury registration are used. Symptoms such as pain or functional limitation most often appear gradually and may be transient in nature, and therefore it is likely that athletes will continue to train and compete despite the presence of overuse conditions, at least in the early phase (**Bahr, 2009**).

Increased youth sport participation has resulted in increased pressure to begin high intensity training at young ages. Such an excessive focus on early intensive training and competition at young ages rather than skill development can lead to overuse injury and burnout **(DiFiori et al., 2014).**

It was found that overuse injuries are responsible for nearly half of all sports injuries in middle and high school students. Estimates of the proportion of all sports injuries that are due to overuse range from 46-54 % **(Kephart, 2014).**

Comment [H3]: this reference is not listed in the reference section.

There is no definitive epidemiological data on young athletes who withdraw from sports activity because of injury. Some young athletes discontinue sports completely, whereas other children may drop out of one sport and still participate in other sports (**Maffulli, 2005).**

Overuse injuries occur due to repetitive submaximal loading of the musculoskeletal system when rest is not adequate to allow for structural adaptation to take place .It can involve the muscle-tendon unit, bone, bursa ,neurovascular structures, and the physis. Overuse injuries unique to young athletes include apophyseal injuries and physeal stress injuries **(DiFiori et al., 2014).**

Hip injuries are common in all sports, but are commonly seen in sports with repetitive, high intensity hip movements, such as track and gymnastics. Tenoperiostitis is one of common injuries in hip joint, strain of the adductor longus loading of the adductor muscles during intensive training may lead to injury and inflammation in the region of the adductor origins, especially of the adductor longus. A more serious overuse injury seen in athletes is a femoral neck stress fracture, which affects the top part of the thighbone. This stress fracture develops over time in athletes who have poor running mechanics, increase their training too quickly, lack of proper nutrition, or excessively train throughout the year. Snapping hip syndrome is an overuse injury that occurs after large amounts of training and practice in a single sport, which leads to strength and flexibility imbalances **(Tyler et al., 2001).**

Research should be devoted to improved understanding of the prevalence, incidence, and economic cost of overuse injuries among pediatric athletes and should focus on prevention and treatment of these overuse injuries **(Mountjoy et al., 2008).**

Funding and support for research into the prevalence, incidence prevention, and treatment of pediatric overuse injuries should be increased **(Federation Internationale de Medecine du Sport/World Health Organization Ad Hoc Committee on Sports and Children 1998).** All athletic health care providers should participate in injury-surveillance efforts, including accurate documentation in keeping with good clinical practice, and Web-based and other registries **(Almquist et al., 2008).**

Comment [H4]: this reference is not listed in the reference section.

Resources and training for athletic health care providers (eg , certified athletic trainer, physician, physical therapist) to collect high-quality injury data must be developed. Children and adolescent suffering untreated injuries turned into overuse injuries having difficulties in continuing participating in their sports **(Mountjoy et al., 2008)**.

Therefore the purposes of this study were to investigate the prevalence and prediction rules for hip joint overuse injuries among children and adolescents Karate players.

SUBJECTS AND PROCEDURES

Subjects:

Fifty nine volunteers karate players of both sexes (45 boys and 14 girls) were enrolled in this study according to the following inclusion criteria: 1) age ranged from 8 to 18 years, 2) a training experience in playing karate for at least 3 years, 3) a frequency at training of at least 3 hours/week 4) belt ranks between (orange and black) and 5) no history of cardiac or respiratory disorders. Players were not allowed to participate if they have

one of the following exclusion criteria; 1) neurological and neuromuscula disorders, 2) fixed deformity of upper or lower limbs and 3) apparent spina deformity. The study was conducted in Port said public and private sports clubs and karate schools, from April 2015 till February 2016.

Materials:

Oslo Sports Trauma Research Centre (OSTRC) Overuse Injury Questionnaire:

This questionnaire is a valid and reliable measure for measuring the occurrence and severity of overuse injuries in sports **(Clarsen et al., 2013)** It consists of four questions that serve as the basis for the assessment of any anatomical area. Hip problems section was used in the current study (Appendix I).

Procedures:

Before the study conduction, a meeting with two members of the Egyptian karate federation of Port Said office was done and from the meeting a list with highly qualified karate masters in port said who their underage teams are frequently in all levels of competitions and events participating was recommended. Initial meetings had been made with those two masters and after illustrating the purpose of the study they agreed to enroll their players into this study and helped clearing and conducting the study, with the help of two other coaches who agreed to participate into the study the procedures were followed. With four coaches and major five clubs the study started at 2015 summer season.

Two hundreds questionnaires were distributed on the players, only 59 players fulfill the questionnaire. Prior to questionnaire distribution, the purposes and procedures were fully explained to the participants and their parents as well. All the player's parents signed their informed consent to have their children enrolled in the study. Players completed a sheet of personal data to collect information (name, age, sex, training age, rank, style training dosage/week, training times/day). Explaining that all questions in the questionnaire should be completed, regardless of whether or not the child had experienced any problems in that area, and giving examples of the most common overuse symptoms in the hip joint. The main objectives of the study which were detecting disabling medical or musculoskeletal conditions and to screen athletes for medical or musculoskeletal conditions that may predispose them to injury or illness, and differentially diagnose acute injuries from overuse ones were clearly explained to each participant.

The collected questionnaires were checked to insure that each player completed all questions answering, then, a physical therapy interview applied confirming information in the questionnaires.

History was taken to recognize previous injuries and other possible signs of overtraining. The physical examination of the musculoskeletal system included evaluation of the stability, symmetry, and range of motion of all joints and the relative symmetry, strength, and flexibility of all major muscle groups. These musculoskeletal assessments include stress tests, and balance tests, compared bilaterally to identify abnormal movement patterns.

Data analysis:

The responses to each of the four questions about participation training volume, performance and pain were allocated a numerical valu from 0 to 25, and these are summed in order to calculate a severity scor from 0 to 100 for each overuse problem. The response values were allocate such that 0 represents no problems and 25 represents the maximum level fo each question. The values for intermediate responses were chosen in order t maintain as even a distribution from 0 to 25 as possible while still usin whole numbers. Therefore, questions 1 and 4 are scored 0-8-17-25, an questions 2 and 3 are scored 0-6-13-19-25. The prevalence of overus problems was calculated for the hip joint by dividing the number of athlete that reported any type of problem in that area by the number of questionnair respondents. A similar calculation was made for the number of athletes wh reported problems leading to moderate or severe reductions in trainin volume, or moderate or severe reductions in sports performance or complet inability to participate in sport (i.e, athletes who selected option 3, 4 or 5 i either Question 2 or Question 3). This is referred to as the prevalence o substantial overuse problems. The average severity score the hip joint wa also calculated weekly by averaging the score of all athletes that reported a problem.

A regression model used to identify predictors/risk factors of hip join overuse injury. At confidence interval 95% each potential factor (age training age, sex, rank, style, training dosage/week, training time/day against hip joint severity score for each player. Data analysis was performe using Analysis tool pak, EXEL, and Microsoft corporation.

RESULTS

A total of 59 questionnaire were completed, 14 by girls (24%) and 45 by boys (76%). The average age of all the participants was 11.7 years (ranged from 8 years to 18 years) and the average of training years was 4.7 years (ranged from 3 years to 13 years). Average training hours per week was 3.5 hour/week (ranged from 3 to 7 hours/week). Average training time/day per minute was 99 minutes/day (ranged from 60 minutes to 150 minutes). Regarding rank distribution, it was brown 2 belt represented by 44.1%, green belt by 15.3%, brown 1 belt by 11.9%, blue and black 1 belts are equally by 10.2%, orange 2 belt by 6.8% and then orange 1 belt by 1.7% Karate style distribution was kumite style at highest frequency by 45.8% kate by 28.8% and then players played mixed type by 25.4%.

Fifty nine players enrolled in the study, 35 of them complained a least one problem at time. Prevalence of overuse injury in the hip joint was 35/59 representing 59.32%. Prevalence of substantial overuse injury in the hip joint was 22/59 representing 37. 29%. The average severity score of the hip joint was 1177/35 representing 33.63 (Table 1).

Table (1): Hip joint overuse injury.

Hip joint	Sum	Total	Average
Prevalence of overuse injury	35	59	59.32%
Prevalence of substantial overuse injury	22	59	37.29%
Severity score of overuse injury	1177	35	33.63

A regression model at confidence interval of 95% was used to determine which of the following factors; age, experience, sex, rank, style training frequency/week, training time/day is a significant predictor for hip joint overuse injury severity score. There is no significant relationship between the previously mentioned factors and hip joint overuse injury severity score (p>0.05) (Table 2).

Table (2): Clinical prediction rules for hip joint overuse injury.

Comment [H5]: ??????

Factor	R2	b- co efficient	*p*-value
Age	0.008	-0.9	0.5
Experience	0.001	-0.3	0.8
Sex	0.002	-2.6	0.7
Rank	2.9	-0.08	0.9
Style	0.01	2.9	0.5
Training frequency/week	0.004	-1.1	0.6
Training time/day	0.007	-0.1	0.6

DISCUSSION

This study was conducted to investigate the prevalence and prediction rules for hip joint overuse injuries among children and adolescents Karate players.

Following **Orchard and Hoskins, 2007** this study used a method for recording overuse problems based on direct reporting from athletes. This approach allows for the use of a broad, "all physical complaints" definition without the systematic bias that could be expected if third-party injury recorders, such as team medical staff, were used to record injuries

The results of this study showed that 35 karate players had curren overuse injury in the hip joint while 22 of them has substantial overus injury in the hip joint. The high percentage of the hip joint overuse injur (59%) may be due the overstretch and high kicks required by the game itsel while movements the hip joint were designed for stability more tha mobility.

The high prevalence of hip joint overuse injuries among children an children and adolescents Karate players come in agreement with **Zghelat e al., 2012** who enlisted the hip joint as the most common injury in karate This could be explained biomechanically as; the hip extensors and abductor play a major role in all ambulatory activities, stabilizing the trunk and hi and helping to transfer force from the lower extremities to the pelvis. Th gluteus maximus plays a major role in stabilizing the pelvis during trun rotation or when the center of gravity is grossly shifted, while the hamstring play a more significant role during activities such as running o jumping. The gluteus medius/minimus are the major stabilizers of the pelvi during single limb stance. Activation of these hip abductors prevents th trendelenberg sign whereby the pelvis contralateral to the weight-bearin extremity tilts downward during the stance phase of gait. The hi musculature thus plays a significant role in transferring forces from th lower extremity up towards the spine during upright activities.

There is no clinical prediction rules for hip joint overuse injury a every factor (age, training age, sex, rank, style, training dosage/week training time/day) was insignificant as predictor.

Limitations:

The validity of the recorded information is dependent on a high response rate throughout the course of the study. As the burden of injury registration is placed upon athletes, much attention and effort needs to be paid to motivating them to respond to the questionnaire. Another limitation is that the amount of details that can be collected directly from athletes is limited. The questionnaire only collects information on the anatomical location of each problem, rather than the injury type or specific diagnosis. This is because we do not expect that athletes will be able to reliably report this information, which should ideally be based on a clinical examination.

Conclusion

It could be concluded that the prevalence of overuse injury in hip joint was 35/59 about 59% of players in the study 35% had substantial overuse injury in hip joint.

Hip joint clinical prediction rules for overuse injury is insignificant for factors (age, training age, sex, rank, style, training dosage/week, training time/day) as predictors.

References

Almquist J., Valovich McLeod T. C., Cavanna A., et al. Summary statement: appropriate medical care for the secondary school-aged athlete. *J Athl Train.* 2008;43(4):416–427.

Bahr R. No injuries, but plenty of pain? On the methodology for recording overuse symptoms in sports. *Br J Sports Med.* 2009; 43:966-972.

Bahr R. Why screening tests to predict injury do not work-and probably never will…: a critical review *Br J Sports Med.* 2016; 0:1-6. doi:10.1136/bjsports-2016-096256.

Brenner J S. Overuse injuries, overtraining, and burnout in child and adolescent athletes. *Pediatrics*, 2007; 119:1242-1245.

Clarsen B, Krosshaug T, Bahr R. Overuse injuries in professional road cyclists. *Am J Sports Med.* 2010;.38:2494-2501.

Clarsen B, Myklebust G, Bahr R. Development and validation of a new method for the registration of overuse injuries in sports injury epidemiology: the Oslo Sports Trauma Research Centre (OSTRC) Overuse Injury Questionnaire. *Br J Sports Med.* 2013; 47:495-502.

DiFiori JP, Benjamin HJ, Brenner J, Gregory A, Jayanthi N, Landry GL, Luke A. Overuse Injuries and Burnout in Youth Sports: A Position Statement from the American Medical Society for Sports Medicine. *Clin J Sport Med.* 2014; 24:3-20.

Eric Kephart DO CAQSM MS (2014): AOASM Annual Conference.

Maffulli N, Caine D. In: Epidemiology of Pediatric Sports Injuries: Team Sports. Maffuli N, Caine D, editor. Basel: Karger; 2005. The epidemiology of children's team sports injuries; pp. 1–8. (Med Sport Sci, Volume 49).

Mountjoy M, Armstrong N, Bizzini L, et al. IOC consensus statement on training the elite child athlete. Clin J Sport Med. 2008;18(2):122–123.

Orchard J, Hoskins W. For debate: consensus injury definitions in team sports should focus on missed playing time. *Clin J Sport Med.* 2007; 17: 192-196.

Tyler TF, Nicholas SJ, Campbell RJ, McHugh MP. The association of hip strength and flexibility with the incidence of adductor muscle strains in professional ice hockey players. *Am J Sports Med.* 2001; 29:124-128.

Zghelat M, Mjaley M, Bzerat S. The Common Sport Injuries Among Kata Players in the Kata Game in Jordan. *An-Najah University Res J.* 2012; 26. Available at: http://hdl.handle.net/20.500.11888/2306

Appendix I
OSTRC Overuse Injury Questionnaire

Hip Problems

Please answer all questions regardless of whether or not you have problems with you hips. Select the alternative that is most appropriate for you, and in the case that you ar unsure, try to give an answer as best you can anyway.

The term "hip problems" refers to pain, ache, stiffness, swelling, instability/giving way locking or other complaints related to one or both hips.

Question 1

Have you had any difficulties participating in normal training and competition due to knee problems during the past week?

□ Full participation without hip problems
□ Full participation, but with hip problems
□ Reduced participation due to hip problems
□ Cannot participate due to hip problems

Question 2

To what extent have you reduced you training volume due to hip problems during th past week?

□ No reduction
□ To a minor extent
□ To a moderate extent
□ To a major extent
□ Cannot participate at all

Question 3

To what extent have hip problems affected your performance during the past week?

□ No effect
□ To a minor extent
□ To a moderate extent
□ To a major extent

□ Cannot participate at all

Question 4

To what extent have you experienced hip pain related to your sport during the past week

□ No pain
□ Mild pain
□ Moderate pain
□ Severe pain