

Sports injuries and health problems among wrestlers in Tehran

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Abstract

Objective: To describe the magnitude of selected sports medicine problems of wrestlers in Tehran. These data are essential in designing preventive measures.

Methods: The population-based cross-sectional survey involved 411 wrestlers who were randomly selected from wrestling clubs in Tehran employing cluster sample setting method. The subjects were interviewed using a specially designed and validated questionnaire.

Results: Wrestling injuries were the reason for 44% of all overnight hospitalisations and one-third of operations in the wrestling subjects studied. The injury rates sustained by the subjects were 5.7 injuries/1000 wrestling exposures, or 42.3 injuries/100 wrestlers/year, or 31.4 injured wrestlers /100 wrestlers/year. Description of these injuries, kind of treatment and some possible risk factors were studied. Skin infections and upper respiratory tract infections (URTI) were the most common diseases which led to missed training sessions. Two-thirds of the subjects had never had a pre-participation physical examination. About half (51%) of the injured wrestlers in the study received no immediate care for their injuries. The most common treatment received by the injured wrestlers was drug therapy and only 3% of the injured wrestlers received exercise therapy. Hand and wrist followed by knee were the most injured parts of the body.

Conclusions: The study found that the rate of injury among Iranian wrestlers is more than the reported rates for US wrestlers. Also, our data showed a high rate of hospitalisation of the subjects due to wrestling injuries. Hence, it is suggested that more attention in terms of research and prevention should be paid to areas such as fracture, hand and wrist injuries and URTI as well as the immediate care of injuries, return to training after the injury and pre-participation physical examination in wrestlers in Tehran.

Keywords: Wrestling, Sports injury, Injury prevention (JPMA 62: 204; 2012).

Introduction

Wrestling is the national sports of Iran and remains quite popular across the country.¹⁻³ Wrestling has been referred to as the most intense and physically demanding sport in which the risk of injury is quite high. This risk has often been ranked only behind American football.⁴

Preventive programmes in sports injury and diseases should be part of a sequence - step 1, surveillance; step 2, risk factor identification; step 3, intervention evaluation; and step 4, implementation.⁵ The first step of this sequence is providing data on occurrence of injury and illness in the target population. The primary target of the step is to locate the sports medicine problems of athletes (e.g. Iranian wrestlers). Respecting these problems, concentrating on education and prevention, and conducting more focussed researches seem to be inevitable.

An appropriate first step towards initiating surveillance and monitoring of athletic health problems could be to conduct a "baseline survey."⁶ The survey could provide

important information for determining the priorities for interventions and to inform different audiences such as policy makers and decision makers about the likely extent and impact of a problem.⁶

To our knowledge, there is no published data on the sports medicine problems of wrestlers in Iran. In addition, data on sports medicine problems of wrestlers in other countries, except the US, are scarce.^{2,3} The current literature on sports injuries and health problems of wrestlers are mainly based on researches on high school and college wrestlers in the US.² Investigation of sports medicine problems of wrestlers in Iran could be beneficial for the prevention of these problems among wrestlers in the country. In addition, these findings seem to be useful in providing new preventive plans at the international level. On the basis of anecdotal findings, we hypothesised that there is a high rate of injury and hospitalisation among the wrestlers in Iran. The objective of the study was to describe the magnitude of sports medicine problems, including wrestling injuries, and their evaluation and treatment among wrestlers in Tehran.

Subjects and Methods

The study was a population-based cross-sectional survey. About 21,000 wrestlers were training in the wrestling clubs in Tehran which accounts for about 10% of all wrestlers in Iran.⁷ The target population of the study was the general population of wrestlers in Tehran. The inclusion criteria for the study was two-fold; wrestlers who were members of wrestling clubs in Tehran and those who had experience of at least one year of wrestling training. To recruit the wrestlers in the study, cluster sample setting method was employed. Tehran was divided into four zones based on geography and socio-cultural parameters. We randomly selected 30% of the clubs in each region and selected about 15% of the population of each club (using the list of registered athletes of the club).

In total, 411 wrestlers were randomly selected from 28 of a total of 95 such clubs in Tehran. The participants were interviewed using a specially designed, validated and reliable questionnaire.⁸ Most health problems were investigated retrospectively mainly during the previous year. The questionnaire that was used for evaluation of the wrestlers covered four main areas: 1) demographic information, including current weight and height of wrestlers, years of wrestling experience and the age at which they started wrestling. 2) History and characteristics of any systemic disease the wrestlers had in the course of their wrestling experience that caused missed trainings/matches and the duration of their absence from training/matches. 3) Characteristics of injuries sustained by the wrestlers and the diagnostic interventions that were used to evaluate their injuries. 4) Suggestion of injured wrestlers regarding possible risk factors in wrestling.

Based on the definition provided by the National Athletic Injury/Illness Reporting System of US for injury, the following injuries were included in the study:

- ◆ any injury that causes cessation of an athlete's customary participation throughout the participation day following the day of onset

- ◆ any injuries that requires substantive professional attention before the athlete's return to participation is permitted (i.e. without such attention, the athlete would not

have been permitted to return to participation on the next participation day)

- ◆ any brain concussion that causes cessation of athlete's participation for observation before return to play is permitted

- ◆ any dental injury requiring professional attention.

The results of the pilot study suggested that the rate of the most important health problems among wrestlers in Tehran, such as sports injury and skin infections in the subjects, are probably between 57% and 87%. Based on these figures (α = Type I error = 0.05, β = type II error = 0.1), for the survey of health problems of the wrestlers in Tehran, the required sample size was calculated to be between 89 and 192 cases. When employing the cluster sample setting method, obtaining a double sample size was thought to be prudent because of the "design effect." Hence, 411 wrestlers were recruited for the study.

Results

The subjects ($n=411$) had a mean age of 19.1 ± 4.0 years (Range 11-42). They had a mean of 4.0 ± 3.4 (Range 1-24) years of wrestling training. The majority ($n=399$, 97%) of the wrestlers were practising freestyle, and 12 (3%) Greco-Roman style.

Two thirds ($n=274$) of the subjects had never had a pre-participation Physical Evaluation (PPE). From the subjects who had experienced a PPE, 59 (43%) had been assessed with a PPE more than one year ago.

Of all the subjects, 123 (30%) (95%CI = 26% to 34%) had been ever hospitalised overnight and 53 (13%) (95%CI = 10% to 16%) had been hospitalised because of wrestling injuries. Therefore, 44% of hospitalisations in these subjects were as a consequence of wrestling injuries. Also 90 (22%) subjects had had surgery before the time of study, but only 29 (7%) subjects had had surgery because of wrestling injuries.

During the proceeding year, 140 (34%) subjects had missed a mean of 6.9 ± 12.0 training sessions (Range 1 to 72) because of different non-trauma diseases and 16 (4%) subjects had missed 1 to 2 matches because of diseases. Skin

Table-1: Percentage (number) of injuries in body parts of the wrestlers.

Head and Neck		Upper Extremity		Trunk		Lower Extremity	
Head	1(2)	Shoulder	16(28)	Upper Back	1(2)	Upper Leg	1(2)
Neck	4(7)	Elbow and Forearm	10(17)	Lower Back	4(7)	Knee	19(33)
Face	6(11)	Hand and wrist	20(35)	Ribs	2(3)	Lower Leg	1(2)
Eye	1(2)	Wrist	3(5)	Sternum	1(2)	Ankle	13(22)
Nose	1 (2)	Thumb	6(11)			Foot	1(2)
Teeth	3(5)	Finger	10(17)				
Other	1(2)	Other	1(2)				
Total	11(19)	Total	46(80)	Total	8(14)	Total	35(61)

Table-2: Nature of the reported injuries.

Nature of the Injury	Number	(Percentage)
Sprain	54	(31)
Fracture	29	(17)
Strain	24	(14)
Dislocation/subluxation	19	(11)
Bruise/contusion	7	(4)
Avulsion	2	(1)
Abrasion/Gaze	2	(1)
Open wound/laceration/cut	2	(1)
Others	35	(20)
Total	174	(100)

Table-3: Initial treatments received by the injured wrestlers.

Treatment	Number	(Percentage)
None	89	(52)
Massage and manipulation	31	(18)
RICE	21	(12)
Strapping/taping	21	(12)
Sling/splint	9	(5)
Dressing	5	(3)
Stretch/exercises	3	(2)
CPR	0	0
Crutches	0	0

RICE: Rest, Ice, Compression, Elevation. CPR: Cardio-Pulmonary Resuscitation.

diseases (47%) followed by upper respiratory tract infections (41%), gastroenteritis (2%), and headache (2%) were the most common diseases that had led to missed training or matches among the wrestlers. Other diseases, including pulmonary diseases, allergy, sinusitis, epilepsy, chicken pox and kidney diseases, led to 8% of match or training absenteeism of the wrestlers due to non-traumatic diseases. These diseases have not been included as injuries in this study. Eight percent of the subjects had a history of falling ill from exercising in the heat.

Of all the subjects, 129 (31%) wrestlers reported that they had sustained 174 injuries during the proceeding year. All the subjects had an estimated 30,825 wrestling exposures in that time. The injury rates sustained by all these subjects was 5.7 injuries/1000 wrestling exposures (95%CI = 4.8 to 6.5) or 42.3 injuries/100 wrestlers/ year (95%CI = 36.0 to 48.6) or 31.4 injured wrestlers /100 wrestlers/year (95%CI = 26.0 to 36.8). In terms of chronicity, 77 percent of injuries were acute ones (new injuries), 10% of injuries were categorised as a second or subsequent episode with an 'injury-free' period between episodes (recurrent injuries), 2% of injuries were unresolved injury from the proceeding year and 1% of them were due to a recent worsening of an unresolved injury.

Injuries caused a mean of 39.3 days (Range 0 to 300 days) off training and a mean of 4.6 days (Range: 0 to 120 days) off work (including absence from school). According to

Table-4: Risk factors for the injuries.

Risk Factor	(Number) of injuries	Percentage
Lack of appropriate supervision	24	(14)
Wrong skill	21	(12)
High risk manoeuvre	17	(10)
Infraction	14	(8)
Lack of warm up	12	(7)
Mat problem*	12	(7)
Opponent low experience	5	(3)
Low physical fitness	5	(3)
Inappropriate shoes	3	(2)
High opponent weight	3	(2)
Weight loss	2	(1)
Tiredness	2	(1)

*Wrinkled cover; a gap between mat parts; a wet mat; and non-standard mats.

the way of injury severity classification previously used by Mechelen,⁹ 77 (44%), 38 (22%) and 59 (34%) of injuries were categorised as mild (1 to 7 days sports lost), moderate (8 to 21 days sports lost) and severe (over 21 days sports lost or permanent damage) injuries respectively.

The distribution of injuries in relation to the affected parts of the body was also noted down (Table-1). On average 1.1±0.29 (range 1-2) scans or laboratory tests were conducted for each injury. In this regard, X-ray radiography was performed for diagnosis of 78 (45%) of injuries followed by Magnetic Resonance Imaging and Computed Tomography which were performed for diagnosis of 7 (4%) and 5 (3%) injuries respectively. It was also found that no imaging or laboratory test was performed for diagnosis of 77 (44%) injuries. The study also looked at the nature of the reported injuries (i.e. their diagnosis) (Table-2). The most common site of fracture was in the wrist and hands (35% of all fractures), followed by the foot and ankle (16%) and the clavicle (13%). The rest were fractures in other areas such as the nose and the ribs. Initial treatments received by the injured wrestlers was also a key data (Table-3). Of the wrestlers who received massage and manipulation as their initial treatment, in 39% the nature of the injury was a sprain or strain, and in 29% of them the nature of the injury was fracture, dislocation or subluxation.

Of all the injured wrestlers 84 (64%) received drug therapy. The number of injured wrestlers who received bracing, plaster and therapeutic modalities for treatment of their injuries were 15 (12%). The other treatments received by the injured wrestlers were manual therapy, exercise therapy, massage and surgery which were used for treatment of 8 (6%), 4 (3%), 4 (3%) and 1 (1%) respectively. Of all the injured wrestlers 28 (22%) received no treatment. Of the wrestlers who received drug therapy, 53 (64.1%) used local ointments or gels. NSAIDs injections on the site of the injury and other drugs were

used by 21 (25%), 5 (6.2%) and 4 (4.7%) respectively.

The injuries occurred during wrestling training in 117 (67%) of the cases, during fitness training in 10 (6%) and during competition in 28 (16%). The study finally looked at the possible risk factors for injuries among the wrestlers (Table-4).

Discussion

Studies on the health problems of wrestlers have mostly included only wrestlers on successful teams at tournaments, or at summer camps.^{10,11} This study was a population-based study targeting the general population of wrestlers in Tehran that covered all levels of wrestlers and from different age groups.

The results suggest that wrestling injuries were a main reason for overnight hospitalisations and operations in wrestlers in Tehran. Therefore, the direct costs of wrestling injuries in Iran might be considerable. These also indicate the importance of prevention in the sphere of sports medicine.

The percentage of serious injuries (resulting in a week or more of abstention from wrestling) among subjects (52% of all injuries) was greater than the percentage of these injuries among the US wrestlers (32.7% to 38.7% of all injuries).^{4,12-14}

Pasque et al¹⁵ reported that injuries lead to a mean of 5 days' (Range: 1 to 39 days) abstention from sports in high school wrestlers. In this study, injuries led to a range of 3 to 180 days (Mean 39 ± 47.6) off sports. This suggested that the severity of injuries might be higher among our subjects compared with US wrestlers, or that the treatment and rehabilitation of injured subjects in Iran were not as effective as the treatment and rehabilitation of injured wrestlers in the US. Our study might have overestimated the percentage of serious injuries because of recall biases that may affect the rate of less severe injuries.

In terms of injury rate, it is difficult to compare the results of the reported data in the literature because of different definitions and methods employed by different studies. Nevertheless, we found 5.7 injuries/1000 wrestler exposures among our subjects, while for the wrestlers in the US the injury has been reported from 5.6 to 9.6 injuries/1000 wrestler exposures.^{4,13-17} Regarding Case rate/100 players/year, the data on wrestlers in the US, according to different studies, show that 11.4 to 37.5 injuries/100 wrestlers/ year were encountered by them.^{15,16,18,19} This index among our subjects was 42.3 injuries/100 wrestlers/ year. A rate of 31.4 injured wrestlers/100 wrestlers/year was obtained from our study. In the US, it has been reported in a range of 8.9 to 40 injured wrestlers /100 wrestlers/year.^{13,16,20}

According to former studies, sprain was reported to be

the most common injury in wrestling (23 to 31% of all injuries) followed by strain (15 to 23% of all injuries), and then contusions and fractures.^{4,13,14} In this study, sprain (31%), fracture (17%) and strain (14%) were the most common injuries. fractures accounted for 4.6% to 6.3% of all injuries in high schools in the US.^{13,15} However, 17% (95%CI = 13.4 to 20.6) of the reported injuries in this study were fractures. These data are not conclusive, however. More research and preventive measures are needed to prevent fractures among wrestlers in Tehran. It would be valuable in the future to investigate the factors that might be important in the occurrence of fractures in wrestling in Iran. Possible factors could be landing techniques, infraction from the regulations during the wrestling manoeuvre (e.g. holding both arms during throwing techniques) and the quality of the mats.

In terms of the injured parts of the body, reported data vary in different studies. However, the knee (15-24% of all injuries) and the shoulder (12-24%) have been reported as the most common injured parts of the body in wrestling.¹²⁻¹⁵ In this study the most commonly injured parts of the body were hand and wrist followed by knee and shoulder. More studies are required to investigate why injuries of hand and wrist are more common among wrestlers in Tehran.

The coach is the key person in the prevention of the most common reported risk factors for wrestling injuries in Tehran such as lack of appropriate supervision, wrong skills, high-risk manoeuvres, infraction of rules, and mat problems.

A small percent (3%) of the injured wrestlers received exercise therapy which is considered an important part in the treatment and rehabilitation. More attention should be paid to exercise as a rehabilitation method for the injured wrestlers in Tehran.

Although it is not scientifically proved, PPE has been employed widely as an opportunity to improve the health and safety of the athletes.^{21,22} The results of this study suggest that most of the wrestlers in Tehran have never had a PPE.

More researches are needed to provide evidence-based guidelines for the initial treatment of sports injuries.²³ However, RICE (rest, ice, compression and elevation), has been employed by sports medicine practitioners worldwide as the immediate care for soft tissue sports injuries.²⁴ About half (51%) of the injured wrestlers in this study received no immediate care for their injuries, and only 12% of them received RICE as initial care for their injuries. More educational programmes seem to be required in this area.

Manual therapy techniques such as massage and manipulation are parts of the traditional medicine of Eastern countries such as Iran. Manual therapy might be beneficial in the treatment of some sports injuries at some stages.²⁵ In two-third of the wrestlers who received

massage and manipulation as immediate injury care, the injuries were those which might have deteriorated by manipulations (e.g. sprains, strains, fractures or dislocations). In these cases, rest and protection are the conventional initial management of injury.

Conclusion

Better education of the coaches and wrestlers is required as well as the provision of a protocol and the required facilities for the initial care of wrestling injuries in Tehran.

The upper respiratory tract infection (URTI) is a common disease among wrestlers in Tehran because, in the standing position, wrestlers spend considerable time in head-to-head position and such close contact might facilitate the transmission of URTI by aerosol contacts. Basic hygiene practices and limiting exposure to infected individuals are important in the prevention of URTI.

This study was a retrospective study therefore some of the injuries might be missed because of the recall biases. Recall biases may particularly affect minor injuries and very severe injuries that cause wrestlers to stop wrestling (i.e. were no longer active wrestlers) and therefore were not included in this study.

References

1. Kordi R, Akbarnejad A, Wallace WA. Catastrophic injuries in the Olympic styles of wrestling in Iran. *Br J Sports Med* 2010; 44: 168-74.
2. Kordi R, Ziaee V, Rostami M, Wallace W. Patterns of weight loss and supplement consumption of male wrestlers in Tehran. *Sports Med Arthrosc Rehabil Ther Technol* 2011; 3: 4.
3. Kordi R, Ziaee V, Rostami M, Wallace WA. Indirect Catastrophic Injuries in Olympic Styles of Wrestling in Iran. *Sports Health: A Multidisciplinary Approach* 2011; 3: 29-31.
4. NCAA Injury Surveillance System (ISS): The National Collegiate Athletic Association, 2003.
5. WHO. Department of Injuries and Violence Prevention, 2003.
6. Le Galès- Camus C, Bonita R, Health NDaM, Organization WH. STEPS: A framework for surveillance. Geneva: World Health Organization, 2003.
7. NFSMI TNFoSMoI. National Athletic Insurance Reports. Tehran: The National Federation of Sports Medicine of Iran, 2005.
8. Kordi R, Mansournai MR, Nourian RA, Neal K, Wallace WA. Development of data collection instruments for evaluation of wrestling injuries and health problems in Iran. *Iran J Public Health* 2005; Supl. : 103.
9. Mechelen MV. The severity of sports injuries. *Sports Med* 1997; 24: 176-80.
10. Kinningham RB, Gorenflo DW. Weight loss methods of high school wrestlers. *Med Sci Sports Exerc* 2001; 33: 810-3.
11. Powell JW, Barber-Foss KD. Injury Patterns in Selected High School Sports: A Review of the 1995-1997 Seasons. *J Athletic Train* 1999; 34: 277-84.
12. Wroble RR, Albright JP. Neck and low back injuries in wrestling. *Clin Sports Med* 1986; 5: 295-325.
13. Powell JW, Barber-Foss KD. Injury Patterns in Selected High School Sports: A Review of the 1995-1997 Seasons. *J Athletic Train* 1999; 34: 277-84.
14. Jarret GJ, Orwin JF, Dick RW. Injuries in collegiate wrestling. *Am J Sports Med* 1998; 26: 674-80.
15. Pasque CB, Hewett TE. A prospective study of high school wrestling injuries. *Am J Sports Med* 2000; 28: 509-15.
16. Wroble RR, Mysnyk MC, Foster DT, Albright JP. Patterns of knee injuries in wrestling: a six year study. *Am J Sports Med* 1986; 14: 55-66.
17. Powell JW. National Athletic Injury/Illness Reporting System: eye injuries in college wrestling. *Int Ophthalmol Clin* 1981; 21: 47-58.
18. Garrick JG, Requa RK. Injuries in high school sports. *Pediatrics* 1978; 61: 465-9.
19. Estwanik JJ, Bergfeld J, Canty T. Report of injuries sustained during the United States Olympic wrestling trials. *Am J Sports Med* 1978; 6: 335-40.
20. McLain LG, Reynolds S. Sports injuries in a high school. *Pediatrics* 1989; 84: 446-50.
21. Carek PJ, Mainous III A. The preparticipation physical examination for athletics: a systematic review of current recommendations. *BMJ USA* 2002; 2: 661-4.
22. Glover DW, Maron BJ, Matheson GO. The preparticipation physical examination. *The physician and sportsmedicine* 1999; 27.
23. Bleakley C, McDonough S, MacAuley D. The Use of Ice in the Treatment of Acute Soft-Tissue Injury: A Systematic Review of Randomized Controlled Trials. *Am J Sports Med* 2004; 32: 251-61.
24. Thornton JS. Pain Relief for Acute Soft-Tissue Injuries. *The physician and sportsmedicine*, 1997.
25. Granter R. Treatment used for musculoskeletal conditions : more choices and more evidence. In: Brukner P, Khan K, editors. *Clinical sports medicine*. 3rd ed. Sydney, New York: McGraw-Hill, 2007; pp 128-58.