

Survey of Wheelchair Athletic Injuries: Common Patterns and Prevention

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Summary

Twelve hundred wheelchair athletes were surveyed to determine commonly experienced athletic injuries, sports participation and training patterns associated with injuries. Soft tissue trauma, blisters, lacerations, decubiti and joint disorders were the most commonly reported injuries of the 128 respondents. Over 70 per cent of all reported injuries occurred during wheelchair track, road racing and basketball. Common mechanisms of injury were also identified. A significantly higher number of reported injuries were associated with increased sports participation ($p < .001$), with the 21-30 year-old age group ($p < .01$), and with a high number of training hours per week ($p < .05$). There was no significant relationship between number of reported injuries and disability type, National Wheelchair Athletic Association classification, or sex. Decubitus ulcers and temperature regulation disorders were identified as particular risks for the spinal cord injury population. Educating the athlete and coach in means to prevent injury is necessary to promote optimal performance and safe participation.

Key words: *Wheelchair athletics; Injuries; Prevention; Sportsmedicine.*

Introduction

An estimated 4000-5000 physically disabled individuals are involved in organised athletic competition within the United States. A large number also participate in recreational sports. The scope of wheelchair athletic participation includes swimming, track and field, road racing, archery, weight lifting, table tennis, tennis, basketball, winter sports, bowling, billiards, boating and many other recreational and competitive sports.

Although numerous publications in recent years have addressed injury prevention and treatment for the able-bodied athlete, little information is available on injuries sustained by the wheelchair athlete. Jackson (1979) reported that 184 athletes were treated for a variety of injuries at the 1976 Torontolympiad for

the Physically Disabled. Corcoran (1980) discussed the potential risks of wheelchair marathon racing. In addition, chronic shoulder problems have been identified as a complication of long-term wheelchair use, especially with increasing age (Nichols, 1979).

The purpose of this study is to determine commonly experienced athletic injuries, sports participation and training patterns associated with injuries among wheelchair athletes. The prevention of such injuries is discussed in this paper.

Method

A questionnaire was distributed to over 1200 disabled athletes. Information was collected regarding each individual's disability, wheelchair sports participation, use of protective gear and history of injuries sustained during these sports activities. There were 128 questionnaires completed.

Results

One hundred and one (101) men (79%) and 27 women (21%) responded. Mean age of respondents was 29.25 ± 7.59 years with a range of 14 to 53, and athletes averaged 14.13 ± 10.39 years since onset of disability. Disabilities included 65 per cent spinal cord injury, 13 per cent post-poliomyelitis, 9 per cent congenital disorders, 3 per cent amputations and 10 per cent other neuromuscular and musculo-skeletal disorders. A breakdown by neurological level using National Wheelchair Athletic Association (NWAA) Classification shows that Class IV (T10 to L2 paraplegia) was the largest group for both men and women, comprising 28 per cent of the total group.

Wheelchair sports participation history

Thirty-two different sports were listed by the athletes responding to the questionnaire. The largest percentages of athletes were involved in track (79%), basketball (71%), swimming (61%), field events (60%) and road racing (57%).

Both males and females reported an average sports participation of 4.35 ± 1.76 days per week. Athletes reported training from zero to over 25 hours per week, with the most common time being from 6–10 hours (36%). Sixty-nine per cent of all who responded reported using protective gear such as gloves, safety glasses or helmets during sports participation to minimise the risks of injury.

Sports injuries

Seventy-two per cent of all athletes responding reported at least one injury from the time of initial participation in wheelchair sports, with some reporting as many as 14 injuries. The 93 athletes who reported injuries sustained a total of 291 injuries. Common injuries reported are listed in Table 1. The most prevalent were soft tissue injuries (33%), blisters (18%) and skin lacerations/abrasions (17%).

Soft tissue injuries, including muscle-pulls, strains, sprains, bursitis and tendonitis, were frequently reported at shoulders, elbows, wrists and hands.

Table 1 Common Wheelchair Sports Injuries

Injury	Percentage of all Injuries Reported (N = 291)
Soft Tissue Injuries*	33
Blisters	18
Lacerations/Abrasions/Cuts†	17
Decubitus/Pressure Areas	7
Arthritis/Joint Disorders	5
Fractures	5
Hand Weakness/Numbness	5
Temperature Regulation Disorders	3
Head Injury/Concussion	2
Dental Injury	1

*Soft Tissue includes sprains, strains, muscle pulls, tendonitis, bursitis.

†Lacerations includes skin infections and other subsequent complications.

Table 2 Injury Patterns Among Five Highest Risk Sports

Sport	Number of injuries reported	Percent of total injuries reported (N = 291)	Percent of athletes participating (N = 128)
Track	93	26	79
Basketball	84	24	71
Roadracing	77	22	57
Tennis	20	6	33
Field events	15	4	60

Many of these injuries were recurrent. Few athletes reported seeking medical attention or treatment and tended to use self-treatment for these injuries. Blisters of the hands and fingers and skin lacerations of the hands, fingers and arms also occurred commonly.

The majority of injuries were associated with track (26%), basketball (24%) and road racing (22%) (See Table 2). Injury risk level has been calculated for all sports in which at least 30 athletes indicated that they participated (Fig. 1). The three highest risk sports for injury in this sample were road racing, basketball and track. Very low injury risk sports include pool, bowling, archery, slalom and table tennis.

For the five highest risk sports individual sport injury patterns varied somewhat. Soft tissue injuries accounted for 33–53 per cent of all injuries in each of the highest risk sports except track, where blisters accounted for 29 per cent of injuries, and soft tissue injuries followed with 27 per cent. Blisters of the hands were a significant problem (20–30 per cent of all reported injuries) in road racing, basketball, track and tennis and, not surprisingly, absent in the field event athlete.

Those athletes involved in a higher number of sports over their participation history report a significantly higher number of injuries ($p < .0001$).

Similarly, a higher number of hours per week spent training was related to a higher number of injuries reported ($p < .02$). A higher than expected proportion of injuries ($p < .01$) was found in the 21–30 years age group.

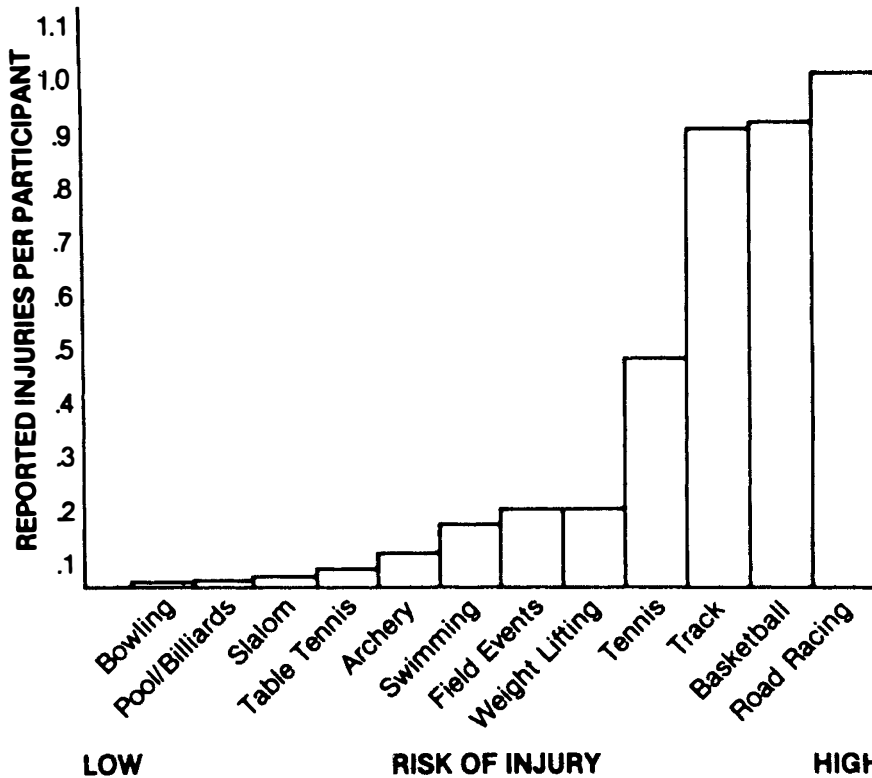


Figure 1. Relative occurrence of reported injuries by sport involvement. Road racing, basketball and track injuries account for 72 per cent of all reported injuries.

There was no significant relationship between sex or age training patterns nor any difference between males and females and number of injuries reported. Disability type and NWAA classification were also not significantly related to the number of injuries reported.

Discussion

A fairly consistent pattern among the high-risk repetitive wheelchair pushing sports (road racing, basketball, track and tennis) were soft tissue injuries, blisters, abrasions and lacerations of hands and arms, and hand weakness/numbness. These findings may indicate an over-use phenomenon, with injury resulting from continuous use of the arms to push the wheelchair. Of particular concern are the soft tissue injuries and hand weakness/numbness which may become chronic problems.

Ligamentous sprains, tendonitis and bursitis may result in chronic problems if treated improperly (O'Donoghue, 1976). Preventive measures should be taken to decrease risk of further injury. As performance can be altered drastically by a recurrent injury, it is in the athlete's best interest to rest an injury, seek medical

Table 3 Injury Causes and Prevention in Wheelchair Athletics

Causes	Soft Tissue Injuries	Prevention
Ligamentous injury (falls, physical contact) Over-use muscles, tendons Overexertion without warmup		Routine stretching, warm-up, cool-down Protection of old injuries (splinting, taping) Slow progression of conditioning program Rest, proper treatment of recurrent injuries
	Blisters	
Friction (hands on wheelchair push rim)		Encourage callous formation Tape fingers; wear gloves
Friction (back) on upholstery and/or seat post		Pad seat post; wear shirt
	Abrasions/Lacerations	
Finger contact with brake, arm-rest socket or pushrim		Remove hazardous wheelchair parts
Scraping inner arms on tires		Wear arm guards—upper arms
Trapping fingers between wheelchairs (basketball)		Camber wheels
	Decubitus/Pressure Areas	
Friction, pressure buttocks/sacrum Wheelchair design (knees elevated)		Adequate cushioning under buttocks Skin checks, weight shifting Nutrition, hygiene
Sweat, moisture		Absorbent clothing
	Temperature Regulation Disorders	
Exposure to heat/cold Inadequate autonomic regulation (SCI)		Insulating clothing Assisted heat convection Minimise exposure
Fluid loss/inadequate intake		Replace fluids

attention, and slowly start on a programme of progressive effort, endurance and power training before returning to a full workout or competitive schedule.

Hand weakness and numbness, commonly associated with the carpal tunnel syndrome, may be caused by the constant trauma and compression of the heel of the hand for each arm stroke on the push-rim. Pain or tingling in the thumb and first two fingers should be signs for the athlete to seek proper diagnosis and treatment.

Mechanisms of common injuries and means of prevention are described in Table 3. The high number of soft tissue injuries, blisters and lacerations point to the need for intervention and proper education of wheelchair athletes and coaches.

As a pilot investigation this study provides subjective, historical information from athletes, not a diagnosis or injury registry by sports medicine professionals. The sample responding to the survey was biased as they were most likely individuals either concerned enough about their injuries to report them or, more likely, to respond because they had sustained injuries. The intent of the survey was to gather information about trends seen in athletic injuries of wheelchair athletes.

In summary it may be helpful for future research in this area to be conducted on the basis of information reported by health professionals to determine the incidence of injury by using a random sample, and to include criteria for ranking the severity of a particular injury (i.e., days missed from training). Athletes, coaches and trainers need to be aware of the causes of and means of prevention

of common wheelchair sports injuries. Good coaching, attention to equipment maintenance, good officiating and good health supervision can all optimize performance and prevent injury.

Résumé

Les courses sur route, le basket et les courses sur piste montraient le plus haut pourcentage de blessures résultant de l'athlétisme en voiture de malade. Athlètes, entraîneurs et moniteurs ont besoin d'être avisés des causes et des moyens de prévention des blessures communes qui résultent des sports en voiture de malade. Le bon entraînement, les soins apportés à l'entretien du matériel, le bon remplissement des fonctions de contrôle et la bonne supervision médicale peuvent tous optimiser les performances et empêcher les blessures.

Zusammenfassung

Strassenrennen, Korballspiel und Bahnrennen zeigten die höchste Prozentzahl der Rollstuhl-athletik-Verletzungen. Athleten, Sportleiter und Trainer brauchen, mit den Ursachen und Verhütungsmitteln von üblichen Rollstuhlsport-Verletzungen bekannt zu sein. Gutes Training, Sorgen für die Materialerhaltung, gute Ausübung der Kontrollfunktionen und gute Gesundheitsaufsicht können alle die Leistungen möglichst verbessern und die Verletzungen vermeiden.

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