



Characteristic of sport injuries in team games for persons with disabilities

Original article/Artykuł oryginalny

© J ORTHOP TRAUMA SURG REL RES 6 (26) 2011

Bartosz Molik, Agnieszka Mędasik,
Ewa Łuczak, Kalina Kaźmierska,
Sebastian Gołębiowski

Józef Piłsudski University of Physical
Education in Warsaw,
Faculty of Rehabilitation

Address for correspondence/
Adres do korespondencji:
Bartosz Molik
Akademia Wychowania Fizycznego
w Warszawie, Wydział Rehabilitacji,
00-968 Warszawa, ul. Marymoncka 34
tel. 22 835 47 98 (fax), 602 374 835
bartosz.molik@awf.edu.pl

Received: 27.05.2011

Accepted: 20.07.2011

Published: 31.10.2011

Summary

Introduction. Injury is an inseparable element of both, able bodied sport and sport for people with disabilities. The role of experts is to eliminate every risk connected with it.

The aim. The aim of this study was to estimate characteristics of sport injuries in wheelchair basketball, wheelchair rugby and sitting volleyball.

Material and methods. In this study took part 147 athletes practicing wheelchair basketball (n=65), wheelchair rugby (n=48) and sitting volleyball (n=34). The research questionnaire consisted of 29 questions was used in this study. Questions among other things contained type of injury, circumstances, localization and reasons of injury, and the length of break for recovery.

Conclusion. Analyses confirmed that wheelchair basketball seems to be sport discipline with high risk of injuries, however consequences of those injuries are not serious (they do not influence on sport carrier significantly). There is a relation between functional abilities (classification) and the number of injuries in wheelchair rugby players and wheelchair basketball players. There is a necessity to introduce new scientific methods enabling development of methods of estimating sport injuries mechanisms and methods of preventing injuries.

Key words: sport injuries, sport for persons with disabilities

STATISTIC STATYSTYKA

Word count Liczba słów	1821
Tables Tabele	2
Figures Ryciny	2
References Piśmiennictwo	26

INTRODUCTION

“Sport injury” is a term common for all kinds of injuries sustained during sport activities. Injury is an inseparable element of both, able bodied sport and sport for people with disabilities. The role of experts is to eliminate every risk connected with it.

Researches confirm that athletes with disabilities are exposed to injuries during training and competition. Most of the researches describing the issue of injuries in paralympic sport were carried out in the 1990s. Main problem was to define sport injury. The majority of definitions concerned medical service intervention, limitation on participation in training or competitions and the presence of pain [1]. The most frequently used definition is the one elaborated by Ferrara and Buckley [2], which says it is “any injury or illness that stopped, limited or modified participation for 1 day or more”.

Diagnosis concerned injuries in paralympic sport is based mostly on questionnaire examination. First reports on this topic were made after Paralympic Games in 1976 [3]. Analysis persuaded in 1990s allowed to present the specificity of injuries in paralympic sport. Results indicate that, for athletes who compete on sport wheelchairs mostly exposed to injuries areas are upper extremity [2, 4, 5, 6, 7].

Other authors researches allowed also to diagnose situations in selected paralympic sport discipline. Among other things it was revealed that 72% of athletes competing in wheelchair races proclaimed an injury during last 12 months [8]. An inflammation of external epicondyle of humerus was indicated as the most frequent reason of injuries among wheelchair users [9]. On the other hand, in spite of surprisingly big amount of sport injuries, it was revealed that most of them were called small (break up to 7 days) or medium injury (break 8-21 days), which consequences were not serious [2]. It was confirmed that, the number of injuries increases with the increase of training capacity [10]. Additionally many authors revealed that, injuries in sport for people with disabilities are

similar to those in port for able-bodied, and that they are connected with practiced sport discipline [11, 12, 13, 14].

During last decade not many reports connected with the issue of sport injuries were presented. Webborn et al. [15] wrote that every tenth athlete, who participated in Winter Paralympic Games 2002, experienced an injury. Whereas Van de Vliet and Willick [16] describing Summer Paralympic Games 2008 (Beijing) noticed more than 2000 medical service intervention. Furthermore, in 79 cases doctors allowed to use prohibited substance [16].

Wheelchair basketball, wheelchair rugby and sitting volleyball are the three the most popular team games intended for persons with physical disabilities that are in the programme of summer paralympic games. Wheelchair basketball is a discipline designed for people with various functional abilities (paraplegia, amputation of lower limbs, people with the minimum disability, who has the locomotion function), that characterizes high dynamics of the game. Wheelchair rugby is a discipline designed mainly for persons with four limbs paresis (mainly quadriplegia) equally attractive for spectators because of adaptation of sport equipment and rules of the game to the abilities of competing athletes. While sitting volleyball is a discipline in which rules are similar to standing volleyball, although in sitting volleyball athletes play on smaller field and the net is lower, but without possibilities of rising buttocks from the ground (with exception for II line) [17, 18].

Every discipline characterizes high dynamic of the game and at the same time it requires from players intense effort. What is interesting, Ferrara and Peterson [1] divided paralympic disciplines into those with high and those with low risk of injuries occurrence. Wheelchair basketball and wheelchair rugby were classified as those with high risk of injuries occurrence.

The aim of this study was to estimate characteristics of sport injuries in wheelchair basketball, wheelchair rugby and sitting volleyball.

Tab. 1. Characteristics of groups of athletes with physical disabilities

	Wheelchair basketball	Wheelchair rugby	Sitting volleyball
N	65	48	34
Age [years]	h	30.0 ± 6.4	29.7 ± 9.8
Training period [years]	9.5 ± 7.3	3.8 ± 3.0	7.6 ± 8.8
Impairment	Spinal cord injury, amputation of Lower limbs, spina bifida, poliomyelitis, persons with a minimum disability	Quadriplegia	Persons with physical impairment – amputation and Lower limbs paresis, poliomyelitis, (stated minimum disability)
Classification* [n]	1.0-1.5: 19 2.0-2.5: 18 3.0-3.5: 14 4.0-4.5: 14	0.5: 20 1.0-1.5: 9 2.0-2.5: 12 3.0-3.5: 7	No athletes' classification

*In wheelchair basketball players are classified from 1.0 (the lowest functional abilities) to 4.5 (persons with minimum disability); in wheelchair rugby players are classified from 0.5 (the lowest functional abilities) to 3.5 (the highest functional abilities)

MATERIAL

It this study took part 147 athletes practicing wheelchair basketball (n=65), wheelchair rugby (n=48) and sitting volleyball (n=34). All athletes had been playing for at least one year, had been practicing at least 2 training sessions per week and they had been actively taking part in league tournaments in their discipline. Characteristic of these three groups of participants is shown in table 1.

METHODS

The research questionnaire consisted of 29 questions was used in this study. Questions among other things contained type of injury, circumstances, localization and reasons of injury, and the length of break for recovery. Answers for the questions were collected during league games. The research results are shown in percentage, separately for every group of athletes.

RESULTS

On the basis of declaration from athletes with disabilities, there was 86% of wheelchair basketball players who had in their carrier at last one injury connected with practiced sport discipline (fig. 1). Similar information was confirmed by 51% of sitting volleyball players and 14 % of wheelchair rugby players.

Among all investigated groups it was confirmed that majority of injuries happened during training.

Fingers and wrist were the most exposed to sport injury areas in all of analyzed sport disciplines for persons with disabilities (40-49% of all injuries; tab. 2). In the second place, area in which injuries were noticed during sport activities, was shoulder and arm (15-37% of all injuries).

In the group of wheelchair basketball players and sitting volley players was registered the most number of abrasions and contusions (respectively 35 and 25% among wheelchair basketball players, 22% and 27% among sitting volley players; tab.2). Dislocation fracture comprised from 8 to 20 % of injuries.

Most of wheelchair basketball players (93%) and sitting volley players (64%) declared break in training, caused by injury, not exceeding one month (tab.2). Whereas most of wheelchair rugby players (60%) indicated, that as a consequence of injury was absence from training longer than one month.

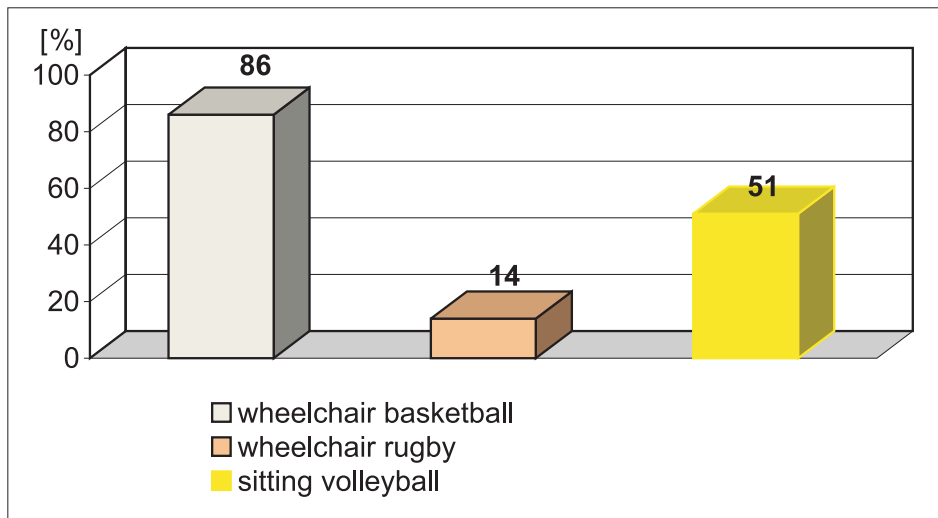
In figure 3 is illustrated occurrence of sport injuries in relation to players sport classification in wheelchair rugby and wheelchair basketball. In both disciplines higher sport class meant higher functional abilities of players. Research results indicate a tendencies according to which in wheelchair basketball group the number of injuries increased with a decrease of functional abilities. Opposite tendency was noticed for wheelchair rugby players –the number of injuries increased with an increase of athletes functional abilities.

DISCUSSION

The aim of the study was characteristics of sport injuries in wheelchair basketball, wheelchair rugby and sitting volleyball. Research results indicated that, wheelchair basketball belongs to sport disciplines, in which there is high risk of injuries. It confirms the rightness of division proposed by Ferrara and Peterson [1]. The studies were compatible with earlier Curtis and Black [19] results, who informed that 90% of female athletes playing in wheelchair basketball are struggling with problems in the area of shoulder. Authors suggested that 70% of injuries is connected with the beginning of training on wheelchairs [19]. Also Burnham et al. [20] showed similar research results pointing to 82% of wheelchair basketball players confirmed an injury during last training year. Eighty-five percent of the significant injuries affected the shoulder, elbow, and wrist region.

According to Burnham et al. [20] the most exposed to injuries athletes are those playing as centre. Presented research do not confirm earlier results indicating a tendency to increase of number of injuries with decreasing

Fig. 1. Athletes declaring injuries presence according to analyzed disciplines



players functional abilities limitation In practice centres are represented mainly by players from 4 and 4,5 sport class in which actually noticed the lowest percentage of injuries.

Gained results of wheelchair basketball players denote high risk of injury emergence, although type of injury and its consequences in majority of cases was not serious. Most injuries were connected with abrasions and contusions in areas of fingers and wrist and also with strains in the area of shoulder. Those types and location of injuries are typical for people practicing sport disciplines using wheelchairs, in which dynamic ride and intense effort determine the success.

The research results deny the classification made by Ferrara and Peterson [1], in which wheelchair rugby was classified into paralympic sport disciplines with high risk of injuries. In scientific research conducted on the level of polish league revealed that only 14% of athletes declared sport injuries during sport carrier. It is worth

mentioning that, wheelchair rugby appeared in paralympic games programme in 2000 (Sydney, Australia) and during last decade significant equipment modifications were introduced. Wheelchairs were divided into offensive and defensive, focusing on lower limb protection using special bumpers. What is more, the usage of gloves by athletes certainly protected them from abrasions. Miyahara et al. [21] acknowledge muscle deficit in the area of shoulder blade and arm adductors as an essential reason for shoulder pain.

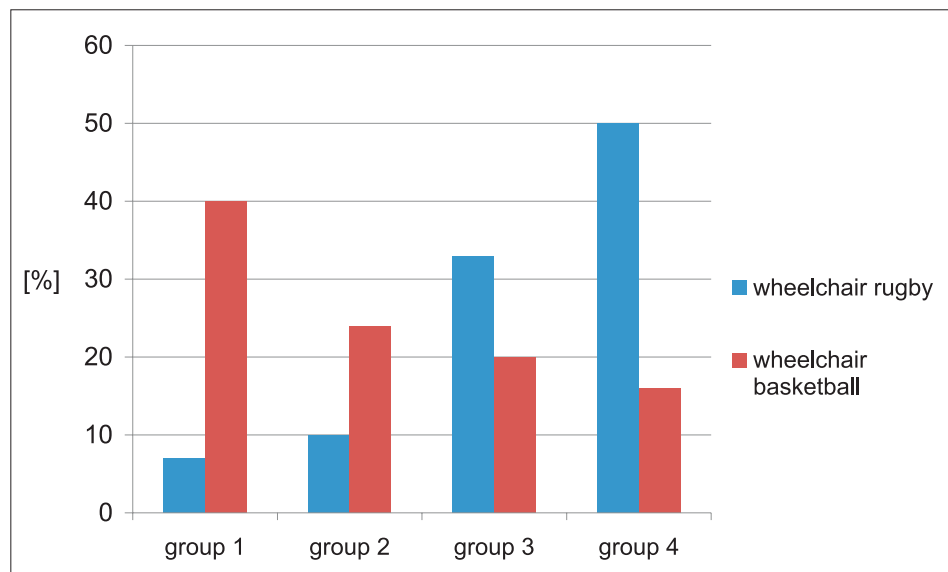
In both disciplines on wheelchairs confirmed beneficial influence of equipment modifications. A tendency for diminishing the number of injuries among athletes on wheelchairs comparing to athletes competing in standing position, as a result of improving sport equipment was noticed by Nyland et al. [12].

As far as in group of wheelchair basketball players dominated big amount of less serious injuries, in group of wheelchair rugby players small number of injuries was

Tab. 2. Results gained in three groups of athletes with disabilities

	Answer	Wheelchair basketball	Wheelchair rugby	Sitting volleyball
Circumstances of injury [%]	Competition	42	20	43
	Training	58	80	51
	Non-sport	0	0	6
The most exposed to injury areas [%]	Wrist, fingers	49	40	46
	Shoulder, arm	15	37	22
	Back	7	13	12
	Other	29	10	20
Type of injury [%]	Abrasion	35	0	22
	Contusion	25	50	27
	Strain	12	37	14
	Dislocation fracture	8	13	20
	Other	20	0	0
Break in training [%]	Month	93	40	64
	Longer than month	7	60	36

Fig. 2. Sport injuries in relation to functional abilities (sport classification) of wheelchair basketball and wheelchair rugby players (group 1 – lowest level of functional abilities, group 4 – highest level of functional abilities)



noted, but their consequences were usually more serious (the break in the training longer than month). Possibly, the reason for more serious injuries could be shorter training practice and minor experience of wheelchair rugby players (tab 1).

Results reported by polish pitting volleyball players differ from those presented by Mustafins et al. [22] on international level. Polish athletes noted mainly finger and wrist injuries, while athletes competing on international level pointed mainly at back (41%) and shoulder (18%) injuries [22]. Wieczorek et al. [23] reported that persons with dysfunction of one limb the other limb for play are often additionally exposed to the overtraining of the healthy limb.

Presented scientific research has diagnostic character. It is worth thinking about method of prevention of injuries. As it was mentioned earlier, modification of sport equipment enables to reduce injuries. Ribeiro et al. [24] highlight benefits of using stretching, proper breaks during intense training, avoiding strains. Other authors indicated the necessity to retain muscle balance, and teaching proper wheelchair riding/running technique [10, 14, 25, 26].

Critical look on injuries in sport for persons with disabilities issue confirm lack of introducing new research methods, beyond questionnaires. Most of the researches were carried out in 1990s and few publications from last decade confirm earlier dispatches. It is necessary to define precisely sport injuries preventive methods. A trial of determining mechanisms of injuries in sport for persons with disabilities is very important, of analyses made in sport for able-bodied. Characteristics of injuries in relation to gender, level of sport advances and age would be interesting.

CONCLUSIONS

Wheelchair basketball seems to be sport discipline with high risk of injuries, however consequences of those injuries are not serious (they do not influence on sport carrier significantly).

There is a relation between functional abilities (classification) and the number of injuries in wheelchair rugby players and wheelchair basketball players.

There is a necessity to introduce new scientific methods enabling development of methods of estimating sport injuries mechanisms and methods of preventing injuries.

References/Piśmiennictwo:

1. Ferrara MS, Peterson CL: *Injuries to Athletes With Disabilities. Identifying to Injury Patterns. Sport Med* 2000;30(2):137-143.
2. Ferrara MS, Buckley WE: *Athletes with disabilities injury registry. Adapt Phys Act Q* 1996;13:50-60.
3. Jackson RW, Fredrickson A: *Sports for the physically disabled: the 1976 Olympiad (Toronto). Am J Sports Med* 1979;7:293-6.
4. Boninger ML, Robertson RN, Wolff M et al.: *Upper limb nerve entrapment in elite wheelchair racers. Am J Phys Med Rehabil* 1996;75:170-176.
5. Ferrara M.: *Injuries to athlete's with disabilities: the state of art In: Doll-Tepper G, Kroner M, Sonnenschein W (eds.) New horizons in Sport for Athletes with Disability. Proceedings of the International Vista 1999 Conference vol 1, Meyer & Meyer Sport; 2001, p. 257-265.*
6. Ferrara MS, Davis RW: *Injuries to elite wheelchair athletes. Paraplegia* 1990;28:335-341.
7. Rawicz – Mańkowski GB: *Urazy w wyczynowym sporcie osób niepełnosprawnych na wózkach. Medycyna Sportowa* 1999;92:24-27.
8. Taylor D, Williams T: *Sport injuries in athletes with disabilities: Wheelchair racing. Paraplegia* 1995;33:296-299.
9. Góralczyk B, Kiwerska-Jagodzińska K, Mikula W: *Zapalenie nadkłykcia bocznoego kości ramiennej u pacjentów poruszających się na wózku inwalidzkim. Medycyna Sportowa* 1999;101:18-20.
10. Curtis KA: *Prevention and Treatment of Wheelchair Athletes Injuries. Athletic Therapy Today* 1997;2,1:19-25.
11. Laskowski ER, Murtaugh PA: *Snow skiing injuries in physically disabled skiers. Am J Sports Med* 1992;20,5:553-557.
12. Nyland J, Snouse SL, Anderson M et al.: *Soft Tissue Injuries to USA Paralympians at the 1996 Summer Games. Arch Phys Med Rehabil* 2000;8,1:368-73.
13. Petrofsky J, Meyer J: *Causes and Suggested Preventatives for Injuries to Monoskiers. Palaestra* 2003,19,1:28-33,57
14. Rawicz – Mańkowski GB: *Urazy w sporcie niepełnosprawnych. Medycyna Sportowa* 1995;45:9-11.
15. Webborn N, Willick S, Reeser JC: *Injuries among Disabled Athletes Turing the 2002 Winter Paralympic Games. Med Sci Sports Exerc* 2006,38,5:811-815.
16. Van de Vliet P, Willick S: *The Beijing 2008 Paralympic Games Medical Care Programme: Facts, Figures and Recommendations. [In:] Book of Abstracts. The 17th International Symposium of Adapted Physical Activity, Gavle, Sweden, 23027 June 2009, 2009, p 44.*
17. Molik B, Morgulec-Adamowicz N, Kosmol A: *Zespołowe gry sportowe osób niepełnosprawnych. Koszykówka na wózkach i rugby na wózkach. AWF Warszawa; 2008.*
18. Morgulec-Adamowicz N, Molik B: *Pilka siatkowa na siedząco W: Molik B (red.) Zespołowe gry sportowe osób niepełnosprawnych. Osoby z dysfunkcją narządu ruchu, niepełnosprawne intelektualnie, niewidome i słabowidzące. AWF Warszawa; 2009, s.37-54.*
19. Curtis KA, Black K: *Shoulder Pain in Female Wheelchair Basketball Players. J Orthop Sports Phys Ther* 1999,29,4:225-231.
20. Burnham RS, Higgins J, Steadward RD: *Wheelchair basketball injuries. Palaestra* 1994;10,2:43-47.
21. Miyahara M, Sleivert GG, Gerrard DF: *The Relationship of Strength and Muscle Balance to Shoulder Pain and Impingement Syndrome in Elite Quadriplegic Wheelchair Rugby Players. Int J Sports Med* 1998;19:210-214.
22. Mustafins P, Landör A, Vetra A et al.: *Rate and type of participation limiting health disorders in sitting volleyball players (health disorders in sitting volleyball players). Papers on Anthropology* 2008,17:233-247.
23. Wieczorek J, Wieczorek A, Jadczyk Ł et al.: *Physical activity and injuries and overtraining syndromes in pitting volleyball players. Studies in Physical Culture and Tourism* 2007; 14(suppl.): 99-305.
24. Ribeiro CB, Lessa Lisboa Y, Gomes de Freitas D: *Performance of the Physical Therapy in the Prevention of the Injuries in Athlete of Basketball in Chair of Wheels. 3rd World Congress of the International Society of Physical and Rehabilitation Medicine ISPRM. Sao Paolo, Brasil, April 10-15, 2005. Electronic version. Medimond - Monduzzi Editore International Proceedings Division, 2005, p. 581-585.*
25. Burnham R, May L, Nelson E et al.: *Shoulder pain in wheelchair athletes. The role of muscle imbalance. Am J Sports Med* 1993;21:238-242.
26. Curtis KA, Tyner TM, Zachary L et al.: *Effect of a standard exercise protocol on shoulder pain in long-term wheelchair users. Spinal Cord* 1999;37:421-429.