DEMOGRAPHIC PROFILE AND ATHLETIC IDENTITY OF TRAUMATIC SPINAL CORD INJURED WHEELCHAIR BASKETBALL ATHLETES IN GREECE

Angelo Vasiliadis
Christina Evaggelinou
Sevastia Avourdiadou
and
Petros Grekinis
Aristotle University of Thessaloniki

An epidemiological study conducted across the country of Greece was conducted in order to determine the profile and the athletic identity of spinal cord injured (SCI) wheelchair basketball athletes who participated to the 13th Greek Wheelchair Basketball Championship and Cup. The Disability Sport Participation questionnaire was used for data collection, which was conducted by Williams. A total of 29 Greek athletes with SCI were participated between November 2007 and May 2008. Twenty-eight men and one woman wheelchair basketball players participated in the study (mean age of 36 years, range 19 – 56 years). The most common cause of injury was traffic accident (75.9%) then falls (20.7%) and injuries from diving (3.4%). Half of the athletes live alone (51.7%) and sixteen athletes (55.2%) graduated from senior high school. Nearly half of them (n = 14; 48.3%) performed about three training sessions per week. From the results it can be deduced that the spinal cord injured athletes of wheelchair basketball constitute the 31.5% of the total number of athletes. They have a basic level of training hours and days per week, they are not trained in a professional class and as result they did not met the relevant criteria to be in an elite class of athletes. Further research is needed to focus on athletic identity and training patterns of all Paralympics sports in Greece in order to evaluate the growth of its sports separately.

Spinal cord injury (SCI) is a life threatening condition that requires a coordinated multidisciplinary approach to manage the injury itself and the potential secondary complications satisfactorily (Inman, 1999). SCI, which results in disruption of the nervous transmission, can have considerable physical and emotion consequences to an individual's life (Eng, Teasell & Miller, 2006).

Competitive sports for individuals with disabilities have experienced an unprecedented growth since the First International Wheelchair Games held in Ayloesbury, England, in 1948 (Steadward, Wheeler & Watkinson, 2003). Wheelchair basketball is one of the most popular sports in the Paralympics Games. Wheelchair Basketball is invented in 1946 in California and New England, USA. Wheelchair sports development at the international level began at the Stoke Mandeville Rehabilitation Hospital. Dr. Ludwig Guttman, in an attempt to help in the rehabilitation of war veterans who had fought in the Second World War, organised Wheelchair Basketball games (IPC, 2008).

Wheelchair basketball is now played in more than 80 countries by some 25,000 men, women and children with a physical disability, which prevents them from playing competitive basketball on their feet. The International Wheelchair Basketball Federation (IWBF) is the governing body for international wheelchair basketball. In 1993, the IWBF became an independent sports federation with 50 member nations. Wheelchair Basketball has been part of the Paralympics program since the Rome 1960 Paralympics (IPC, 2008).

Wheelchair basketball was held for the first time in Greece in 1988 during the first Greek Championship of Persons with Physical Disabilities in the capital of Athens between two teams. In 1995 newly established Hellenic Wheelchair Basketball Federation (H.W.B.F.) (Evaggelinou &

Vanlandewijck, 2000) organizes the Greek wheelchair basketball championship. Today, this organization is the governing body for the teams playing North and South. The National wheelchair basketball team represented Greece during Paralympics Games of Athens 2004. There are published data about the relationship of functional potential and field performance in wheelchair basketball players (Vanlandewijck, Evaggelinou, Daly, Verellen, van Houtte, Aspeslagh et al, 2004). In addition research has been written about the proportionality of wheelchair basketball classification (Vanlandewijck, Evaggelinou, Daly, van Houtte, Verellen, Aspeslagh et al, 2003) and the profile and opinions of wheelchair basketball players in Greece (Evaggelinou & Katartzi, 1999). However, there isn't any published data on the epidemiology of SCI in Greece

Internationally, there is not much published about demographic profile and athletic identity of wheelchair basketball athletes with SCI. A study conducted in Japan and especially in Konagawa Rehabilitation Center, which described a recreational sport for tetraplegics in 1980 and also gave some demographic data about these athletes (Uchida, Yamagushi, Hayashi, Inasaka, Fukuda, Hasegawa et al, 1994). Another study conducted in Turkey, described training patterns of wheelchair basketball players and referred educational level, wheelchair basketball classification score and some demographic data of the athletes (poliomyelitis, amputation and spinal cord injury) (Tatar, 2008). To our knowledge, a nation-wide epidemiological survey on wheelchair basketball athletes with spinal cord injury has not yet been available. The need for investigation of the devlopment and growth of wheelchair basketball in Greece is important in order for the sport to grow and attract more and more new athletes. The present study attempts to provide an epidemiological description of the group of spinal cord injured wheelchair basketball players in Greece.

Method

Procedure and data collection

The Disability Sport Participation questionnaire was used for data collection, which was conducted by Williams (Wu & Williams, 2001). The SCI wheelchair basketball athletes were interviewed at the end of each game using a self-report interview format by the researcher, during the championship session, which was carried out from November 2007 to May 2008. The questionnaire was administered by the same person, in order to avoid the influence of variability among different interviewers. The inclusion criteria consisted of being a participant of the Greek Wheelchair Basketball Championship, participating in the Greek Wheelchair Basketball Cup from the period 2007-2008 and participating in least half of games of the national championship and cup. Questions were grouped under the headings of athlete's personal information; age, sex, date of injury, level of injury, cause of injury, marital status, employment, occupation, years of injury and athletic identity; classification grade, days of training per week, hours of training.

Data analysis

Demographic and medical data was analyzed descriptively in terms of percentages. Cross tabulation was used between level of injury; cervical, thoracic and lumbar) and extent of injury; complete and incomplete. For this statistics, the statistical software program Statistical Package for the Social Sciences was used (SPSS, 2000). Averages are expressed as mean ± standard deviation (std.).

Results

In this study, 29 athletes with SCI were identified. The wheelchair basketball athletes included 29 SCI (31.5 %) and 63 others (68.5 %) including athletes with amputation, polio, cerebral palsy, hemiplegia, and others neurological diseases.

Table 1

SCI wheelchair basketball athlete's cases in 2008. Distribution of cause of injury

Cause	*N (%)*
Traffic	22 (75.9)
Car	11 (37.9)
Motorcycle	8 (27.6)
Other	3 (10.4)
Falls	6 (20.7)
From less than 1 m	4 (13.8)
From more than 1 m	2 (6.9)
Sports	1 (3.4)
Diving	1 (3.4)

Causes of SCI

The most common cause of injury was traffic accident (75.9 %) followed by falls (20.7 %) and injuries from diving (3.4 %). From all traffic accidents, 11 athletes (37.9 %) were car drivers; eight (27.6 %) were motorcycle drivers and three other vehicles. This falls from less than 1m (13.8 %) were twofold than falls from more than 1m (6.9 %). (see Table 1 above)

SCI level and extent of injury

Two athletes (6.9 %) had cervical injuries, 24 (82.8 %) thoracic injuries and three (10.3 %) lumbar injuries. The most common level of injury was T12 (27.6 %) of all levels with a second peak in the mid-thoracic region T7 (13.8 %) as shown in figure 1.

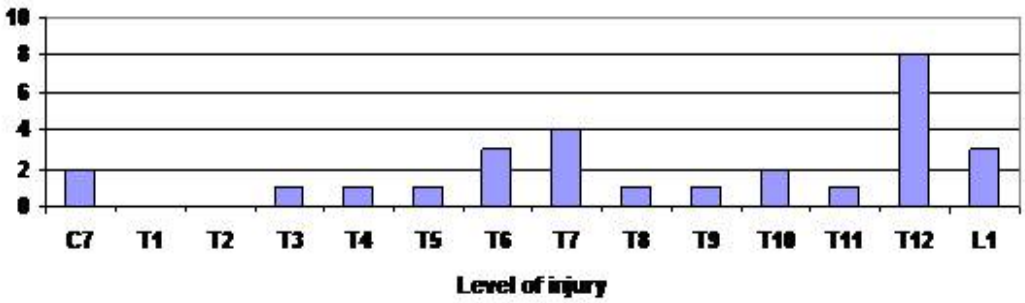

Figure 1.
Distribution of SCI by level of lesion

Paraplegia was the most common neurological disability. The majority (62.1 %) of the athletes had an incomplete SCI. Eleven athletes (7.9 %) had complete paraplegia. Six point nine percent (6.9 %) had an incomplete tetraplegia and 55.2 % presented an incomplete paraplegia.

Table 2
Incidence of SCI from traumatic causes by neurological level and extent of injury (counts and column percentages)

Extent of Injury	*Tetraplegia*		*Paraplegia*				*Total*	
	Cervical		*Thoracic*		*Lumbar*			
	Count	*%*	*Count*	*%*	*Count*	*%*	*Count*	*%*
Complete			10	34.5	1	3.4	11	37.9
Incomplete	2	6.9	14	48.3	2	6.9	18	62.1
Total	2	6.9	24	82.8	3	10.3	29	100

Time of SCI

With respect to the timing of SCI it was noted that March, July and August had the highest incidences for injury. On a week-to-week basis, Saturday and Sunday were the days on which nearly 45 % of injuries occurred.

Table 3
Month of injury

Month	*Number of patients*
January	0
February	1
March	4
April	3
May	3
June	2
July	4
August	4
September	3
October	3
November	2
December	0

Table 4
Day of injury

Day of week	*Number of patients*
Monday	2
Tuesday	4
Wednesday	3
Thursday	4
Friday	3
Saturday	6
Sunday	7

Gender and age

There were 28 males and one female with SCI. The mean age was 36.34 years (range 19-56). The average age at injury was 23.9 ± 8.41. The most prevalent age group was 20-29 (48.6 %) following by 0-19 (31 %) and 35-39 (17 %). In addition, 79.6 % were aged between 0-29 years.

Table 5
Characteristics of SCI wheelchair basketball athletes

Variable	*N*	*%*	*Mean*	*Std Dev*
Sex				
Male	28	96.5		
Female	1	3.5		
Age			36.34	7.84
0-19	1	3.4		
20-29	5	17.3		
30-39	14	48.3		
40-49	8	27.6		
> 50	1	3.4		
Age of injury			23.9	8.41
0-19	9	31		
20-29	14	48.6		
30-39	5	17		
> 40	1	3.4		
Marital status				
Single	19	65.5		
Married	6	20.7		
Divorced	2	6.9		
Widowed	2	6.9		
Living situation				
Alone	15	51.7		
Wife and children	8	27.6		
Parents	6	20.7		
Educational level				
High school (<14)	5	13.8		
Senior high school (>14 and <18)	16	55.2		
Technological institute	3	10.3		
University	5	20.7		
Occupation				
Retired	16	55.2		
Municipal employee	7	24.1		
Freelancer	4	13.8		
Employee in private sector	2	6.9		

Marital status and living situation

The age group 30-39 years accounted for the largest number of athletes with SCI (48.3 %). Sixty five point five per cent were single and only six athletes (20.7 %) were married. Half of them (51.7 %) lived alone and were independent for their all day living activities. Eight athletes (27.6 %) were living with their wives and children and 20.7 % living with their parents (Table 5).

Educational level and occupation

Table 5 shows the distribution of educational level and occupation. Sixteen athletes (55.2 %) graduated from senior high school followed by thirty one per cent (nine athletes) who had graduated from

technological institute or university. Forty-four point eight per cent of the athletes were working while 55.2 % were retired.

Athletic identity

In order to play in a main Official competition of IWBF each player must be in procession of an Official Player Classification ID card issued by the Player Classification Commission of IWBF. The valid player classifications in the IWBF are 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0 and 4.5 (IWBF, 2008). According to the classification system of IWBF, 31 % (9 athletes) were classified with 1.0 point. There were nine athletes with a spinal cord injury above T6 level. Eight of them were classified with 1.0 point and one with T3 level of injury classified with 1.5 points. It was reported, that nearly half of the athletes (48.3 %; n=14), performed about three training sessions per week (3.07 ± 1.07 training session) in which, they spent at about 5.48 hours of training per week (std. ± 2.03).

Table 6
Characteristics of SCI wheelchair basketball athletes

Variable	*N*	*%*	*Mean*	*Std.D*
Classification				
1.0	9	31		
1.5	7	24.1		
2.0	7	24.1		
2.5	5	17.3		
3.0	1	3.5		
Days of training per week			3.07	1.07
2 days	9	31		
3 days	14	48.3		
3 + more	6	20.7		
Hours of training per week			5.48	2.03
Less than 5 hours	13	44.8		
More than 5 hours	16	55.2		

Table 7
Cross tabulation between level of injury and classification

Level of injury	*Classification grade*					*Total*
	1.0	*1.5*	*2.0*	*2.5*	*3.0*	
C7	2					2
T3		1				1
T4	1					1
T5	2					2
T6	3					3
T7		2	1	1		4
T8				1		1
T9			1			1
T10		1	1			2
T11		1				1
T12	1	2	2	3		8
L1			2		1	3
Total	9	7	7	5	1	29

Discussion

This survey involved a sample of 29 spinal cord injured athletes representing the 31.5 % of the Greek wheelchair basketball athletes. In Greece, there are only 11 wheelchair basketball teams (Figure 2 next page).

The official rule of wheelchair basketball allows women to participate in Greece as well as in other countries. Women can participate in men's wheelchair basketball championships since there are not many women athletes able to form separate wheelchair championship. In addition able-bodied athletes were allowed to participate (Brasile, 1992).

In this survey the peak incidence of spinal cord injury is within the age group of 20 – 29 years comprising 48.6 %. This finding is quite similar to most published spinal cord injury literature, which

suggests that traumatic spinal cord injury predominantly involves young people (Pickett, Campos-Benitez, Keller & Duggal, 2006; O'Connor & Murray, 2006; Karacan, Koyuncu, Pekel, Sumbuloglu, Kirnap, Dursun et al, 2000).

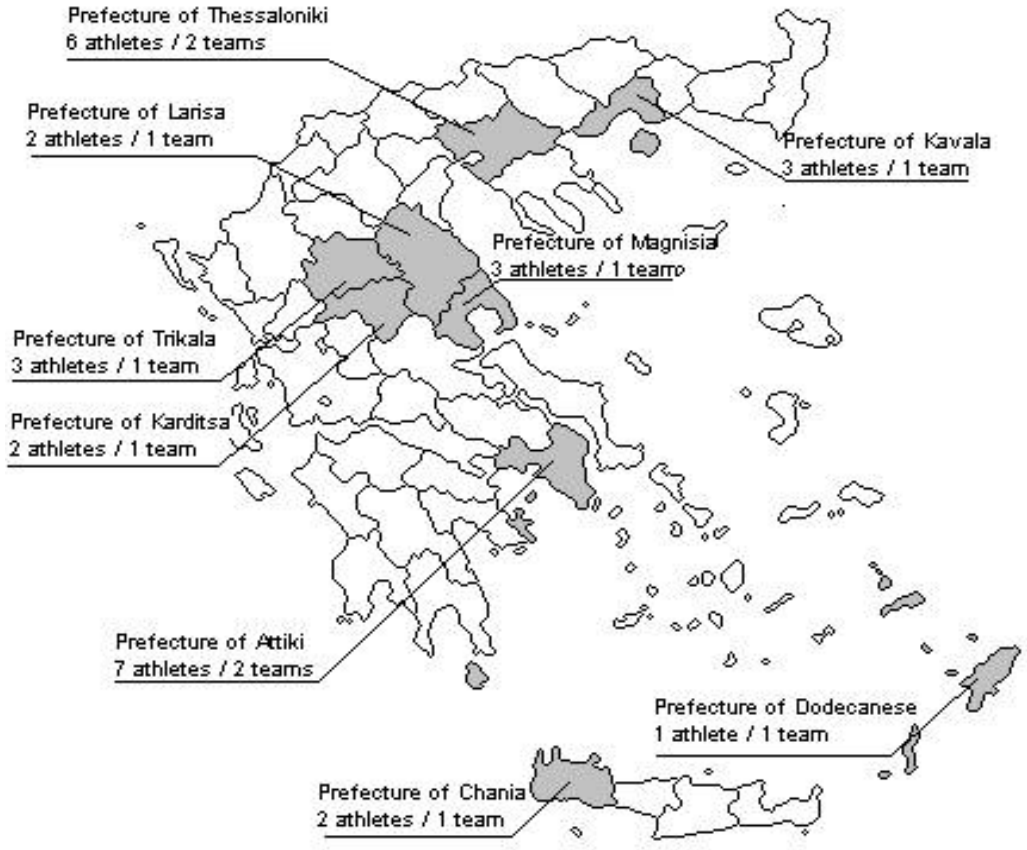

Figure 2.
Regional distribution of the number of SCI wheelchair basketball athletes and teams in prefectures of Greece

Regarding the causes of spinal cord injury, traffic accidents comprised the highest percentage (75.9 %). In several epidemiologic studies traffic accidents were reported to be the most common cause of spinal cord injury (44.4 to 52.2 %) (O'Connor & Murray, 2006; Karacan, Koyuncu, Pekel, Sumbuloglu, Kirnap, Dursun et al, 2000; Chen & Lien, 1985; Garcia-Reneses, Herruzo-Cabrera & Martinez-Moreno, 1991). As is commonly accepted the region of the twelfth thoracic was the segment most exposed to trauma (Karacan, Koyuncu, Pekel, Sumbuloglu, Kirnap, Dursun et al, 2000; Hoque, Grangeon & Reed, 1999). In this survey, T12 was the most frequent affected segment (27.6 %).

One very interesting point that emerged during the analysis of this study was that during Christmas and Eastern holidays low incidences of spinal cord injury occurred as compared to the summer holidays. However, weekends were a more common period that accidents occurred. Factors that influence this might include travelling home after a late night out and possibly using alcohol, drugs, or both. O'Connor and Murray (2006) reported that Saturday and Sunday were the days on which nearly 40 % of injuries occurred.

The results of this survey showed that although the athletes were young people (mean age 36.34), many were single and lived alone without parents, wife and children, or both. From the other hand, over the half (55.2 %) were retired. Accordingly their disability and sports seemed to be their only way out.

This survey reveals that spinal cord injured athletes does not classify more than 3.0 points. Athletes with spinal cord injury below T6 level were classified with 1.0 point and only one athlete with T3

injury level was classified 1.5 points. Athletes with thoracic injury between T7 to T12 were classified from 1.5 to 2.5 points except of one athlete with T12 injury who classified with 1.0 point. One athlete with L1 injury was classified with 3.0 points and the other two with 2.0 points.

The findings of this study also show that training hours and days were at about five hours and three days respectively. These findings are related with the theory that in order to enhance cardiopulmonary fitness in wheelchair sports, exercise sessions should occur two-five times per week (Davis & Ferrara, 1995). These results were in contrast with the theory that a successful training regime in elite athletes with disabilities a training frequency of 5-6 days per week is successful (DePauw & Garvon, 1995). Although, wheelchair basketball athletes in Greece seem to be training a little bit more from wheelchair basketball athletes in Turkey (Tatar, 2008).

Conclusions

This survey is the first step in order to determine the exact number of spinal cord injured athletes who participate in wheelchair basketball in Greece. An overall of 87 individuals in the Central and West Macedonia region sustained a traumatic spinal cord injury with an incidence of 33.6 per million population (Divanoglou & Levi, 2009). On the other hand, the exact numbers of athletes who are taking part in wheelchair basketball at Thessaloniki are only six individuals and 29 in total in Greece. Furthermore, from the results of this survey derive the need of promotion of all the sports, especially the sport of wheelchair basketball, in Greece, in order to create more teams and competitive championships. Future research should be focused to assign all the population of spinal cord injured athletes in other Paralympics summer sports such as swimming, athletics and others in Greece.

The results of this study will serve as a basis for further studies in order to create a base of demographic data of athletes in which will be supported the promotion of athletic spirit. This study will encourage and sensitise all the people that work in sports in Greece to include the disabled athlete. This effort becomes to attract more new and young individuals in wheelchair basketball in Greece, in order Greek athletes will become more competitive in the European championships. Finally, there is a hope that more teams will be created in the near future; in order Greek championship will become more competitive.

Acknowledgements

The authors express their special gratitude to all the athletes for their voluntary participation in this survey.

References

Brasile, F. (1992). Inclusion: A development perspective. A rejoinder to 'Examining the concept of reverse integration'. *Adapted Physical Activity Quarterly, 9,* 293-304.Eng, J. J., Teasell, R., Miller, W. C. (2006). *Spinal cord injury: rehabilitation evidence*. Vancouver, Canada: Handbook:ICORD.

Chen, C. F., Lien, I. N. (1985). Spinal cord injuries in Taipei, Taiwan, 1978-1981. *Paraplegia, 23,* 364-370.Evaggelinou, C., Katartzi, E. (1999). *Profile and opinions of wheelchair basketball players regarding wheelchair basketball in Greece.* International Conference of Movement and Health, 11 – 14 September 1999, Olomouc, Czech Republic.

Davis, R. W., Ferrara, M. S. (1995). Sports medicine and athletes with disabilities. In K. P. DePauw & S. J. Garvon (Ed.), *Disability and sport* (pp. 133-149) Champaign, IL: Human Kinetics.

DePauw K. P., Garvon S. J. (1995). *Disability and Sport.* Champaign, IL: Human Kinetics.

Divanoglou, A., Levi, R. (2009). Incidence of traumatic spinal cord injury in Thessaloniki, Greece and Stockholm,Sweden : a prospective population-based study. *Spinal Cord*, 1-6.

Evaggelinou, C., Vanlandewijck, Y. (2000). *Current scientific views about wheelchair basketball*, 2nd Greek Seminar of Wheelchair Basketball, 14 – 16 April 2000, Serres, Greece.

Garcia-Reneses, J., Herruzo-Cabrera, R., Martinez-Moreno, M. (1991). Epidemiological study of spinal cord injury in Spain 1984-1985. *Paraplegia, 28,* 180-190.

Hoque, F., Grangeon, C., Reed, K. (1999). Spinal cord lesions in Bangladesh: an epidemiological study 1994-1995. *Spinal Cord, 37*, 858-861.nman, C. (1999). Effectiveness of spinal cord injury rehabilitation. *Clinical Rehabilitation, 13,* 25-31.

IPC (2008, March 13). *International Paralympic Committee*. Retrieved from http://www.paralympic.org

IWBF (2008, November 18). *International Wheelchair Basketball Federation*. Retrieved from http://www.iwbf.org/pdfs/2008_Rule_Book_V1.pdf

Karacan, İ., Koyuncu, H., Pekel, Ö., Sümbüloğlu, G., Kirnap, M., Dursun H, et al. (2000). Traumatic spinal cord injuries in Turkey: a nation-wide epidemiological study. *Spinal Cord, 38*, 697-

701.O'Connor, R. J., Murray, P. C. (2006). Review of spinal cord injuries in Ireland. *Spinal Cord, 44*, 445-448.
Pickett, G. E., Campos-Benitez, M., Keller, J. L., Duggal, N. (2006). Epidemiology of traumatic spinal cord injury in Canada. *Spine, 31*, 799-805.
Statistical Package for the Social Sciences, v10.0, SPSS Science, Chicago, IL, rel. 2000.
Steadward, R. D., Wheeler, G. D., Watkinson, E. J. (2003). *Adapted physical activity*. Alberta, Canada: The University of Alberta Press.
Tatar, Y. (2008). Training patterns of wheelchair basketball players in Turkey. *International Journal of Special Education, 23*, 128-135.
Uchida, A., Yamagushi, S., Hayashi, T., Inasaka, R., Fukuda, J., Hasegawa, T., et al. (1994). Tetraplegic wheelchair basketball. *Paraplegia, 32*, 59-62.
Vanlandewijck, Y., Evaggelinou, C., Daly, D., Verellen, J., van Houtte, S., Aspeslagh, V., et al. (2004). The relationship between functional potential and field performance in elite female wheelchair basketball players. *Journal of Sports Sciences, 22*, 669-675.
Vanlandewijck, Y., Evaggelinou, C., Daly, D., van Houtte, S., Verellen, J., Aspeslagh, V., et al. (2003). Proportionality in wheelchair basketball classification. *Adapted Physical Activity Quarterly, 20*, 369-380.
Wu, S. K., Williams, T. (2001). Factors influencing sport participation among athletes with spinal cord injury. *Medicine and Science in Sports and Exercise, 33*, 177-182.