TRAINING PATTERNS OF WHEELCHAIR BASKETBALL PLAYERS IN TURKEY

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The aim of this study was to analyze technical drills, warm-up and cool-down exercises used by wheelchair basketball players of the Turkish league in relation to training sessions. 33 male wheelchair basketball players participated in the study (mean age 26.6±5,95 years).
All players reported that they used warm-up exercises before the training, but only 20% used cool-down exercises after the training session. 60,6% of the participants trained 3-5 hours in a week, while 87,9% trained at 2 days of a week.
None of the players used special equipment for improvement of flexibility, strength and endurance. Some players and teams reported that they had technical-tactical drills in the training. Generally the training consisted of a short warm-up and technique drills followed by a match.
In conclusion, training intensity, technical-tactic drills and conditioning exercises in the training session of the players in the Turkish wheelchair leagues did not met the relevant recommendations.

Wheelchair basketball is a sport which is gaining popularity among persons with disabilities all around the world, as well as in Turkey. This increase in the number of players has raised concern about training issues and related problems. An additional problem in Turkey is the insufficient number of qualified trainers of wheelchair basketball.

A total of 38 wheelchair basketball teams take part in the Turkish leagues, and seven of these teams are from Istanbul. In Turkey there are about 900 registered, and about 500 active athletes with a disability. The majority of them participate in wheelchair basketball. The aim of this study was to analyze technical drills, warm-up and cool-down exercises used by wheelchair basketball players of the first and second division of the Turkish league in relation to training sessions.

Regardless of age, gender, and medical history, most wheelchair users can derive benefits from appropriately designed exercise programs. Well-established principles of *specificity* and *overload* should be followed to obtain the desired results in an efficient manner (Glaser & Davis, 1989; DePauw & Gavron, 1995). The training program for persons with disabilities should comprise the five major motor abilities which are endurance, flexibility, coordination, strength, and speed (Kelley & Freiden, 1980; International Coordinating Comittee of World Sports Organisations for the Disabled, 1986; DePauw & Gawron, 1995; Knechtle & Köpfli, 2001).

In this context warm-up and cool down exercise should be included in the training program, both for their positive effects on physiological systems and for prevention of injuries (Kelley &Freiden 1980; Owen, 1982; Labanowich, 1998; Green, 1999).

Owen (1982) divides the training season for wheelchair basketball into two distinct periods which are training before and training during the competitive season Some researcher use a more elaborated training program which comprise of the preseason or preparatory phase; the season/competitive phase; and postseason (Sharley, 1990). The intensity and type of training should be determined separately for each training phase according the demands of wheelchair basketball.

Pre-season exercises focus on strength development of specific muscle groups, actions, and energy systems (Green, 1999). Providing that athletes do not forget fundamentals nor get into bad habits, running up and down the court playing fast break basketball, is regarded an excellent way to condition the player for the season to follow (Owen 1982). Strength, endurance, flexibility and speed performance can be enhanced by technical-tactical play drills. But wheelchair basketball trainers should also include special exercises beside these drills in their training program to enhance the condition of their players: weight training, speed training; endurance training; and exercises for special muscle groups. Developing offensive and defensive skills aids to conditioning (Kelley & Freiden, 1980; Owen, 1982; Green, 1999). Sprints, repeated often enough to improve your wheelchair handling and supervised weight training to help improve the strength of muscle groups used in wheelchair basketball should be dispersed in the training both before and during the competitive season (Kelley & Freiden, 1980; Owen, 1982; Green, 1999).

During the competitive season athletes will need to work more on sprints and drills that emphasize speed over short distance (from 50-100 feet). Frequent repetitions at different speed and endurance challenges are a fundamental of wheelchair basketball. Most in-season conditioning is gained from participation in vigorous drills at team practices (Owen, 1982).

Fundamental wheelchair basketball skills to be trained intensively include dribbling, bounce-stop, bounce spin, catching, shot and lay-up (ICC-WSOD, 1986; Gutmann (as cited in Yilla, 1997); Labonowich, 1998; Zwakhoven, Evaggelinou, Daly, & Vanlandewicjck, 2003; Davis & Sherrill 2004).

Shooting performance, especially for free throws, is crucial in wheelchair basketball. The players individual performance depends to a great extent on his scoring performance by accurate shooting. Therefore it is of vital importance that shooting skills are improved by training from different positions using variable techniques. (Owen, 1982; Gutmann (as cited in Yilla, 1997); Malone, Nielsen, & Steadward, 2000; Goosey-Tolfrey, Morriss, & Butterworth, 2002; Malone, Gervais, & Steadward, 2002; Nunome, Doyo, Sakurai, Ikegmai, & Yabe, 2002; Zwakhoven et al. 2003; Davis & Sherrill 2004).

Method

33 players of the Turkish wheelchair basketball leagues (age mean 26.6±5,95 year) participated in the study. They were asked 2 open-end, and 27 closed-end questions. In addition to the written questions, the participants were asked whether they used any other training methods or exercises.
Educational level (table 1), wheelchair basketball classification score (table 2), and some demographic data (table 3) of the participators are listed below:,

Table 1
Educational level of participants

Educational level	Frequency	Percent
Primary-secondary school	15	45,5
High School	15	45,5
Faculty	2	6,1
Post-graduate	1	3,0
Total	**33**	**100,0**

Table2
Wheelchair basketball classification score of the participants

Classification score	Frequency	Percent
1,50	4	12,1
2,00	6	18,2
2,50	3	9,1
3,00	8	24,2
3,50	2	6,1
4,00	8	24,2
4,50	2	6,1
Total	**33**	**100,0**

Table 3
Some demographic data of participants

Demographic data	Frequency	Percent
1- Kind of Medical Problem		
Polio-survivors	20	60,6
Persons with spinal cord injury	8	24,2
Persons with amputation	5	15,2
2- Emergence of the medical problem		
Congenital	4	12,1
Acquired	28	87,9
3-Daily use of wheelchair other than for sports		
Yes	3	9,1
No	20	60,6
Sometimes	10	30,3
4- Participation in sports other than wheelchair basketball		
No	19	57,6
Track and field	7	21,2
Table tennis	4	12,1
Table tennis and swimming	1	3
Volleyball	1	3
Swimming	1	3

Results

The findings of the participants are listed below (table 4, table 5):

Table 4
Quantitative Training parameters of the wheelchair basketball players

Training parameters	Frequency	Percent
1- Duration of participation in wheelchair basketball		
Less than 1 year	2	6,1
1-3 years	9	27,3
3-5 years	6	18,2
More than 5 years	16	48,5
2- Duration of participation in regularly wheelchair basketball training		
Less than 1 year	4	12,1
1-3 years	13	39,4
3-5 years	3	9,1
More than 5 years	13	39,4
3- Training days per week		
2 days per week	29	87,9
3 days per week	4	12,1
4- Training hours per week		
1-3 hours per week	7	21,2
3-5 hours per week	20	60,6
5-7 hours per week	6	18,2

Table 5
Training patterns of participants

Training patterns	Frequency	Percent
1- Do you warm-up before exercise		
Yes	33	100,0
2- Do you cool-down after exercise		
Yes	6	18,2
No	27	81,8
3-Tour around the court with wheelchair		
every time	26	78,8
Sometimes	7	21,2
4- Basic stretching and flexibility exercises on the wheelchair		
every time	23	69,7
Sometimes	10	30,3
5-Basic stretching and flexibility exercises on the floor		
every time	3	9,1
Sometimes	2	6,1
Never	28	84,8
6- Speed competition with wheelchair on the court		
every time	15	45,5
Sometimes	16	48,5
Never	2	6,0
7- Drills on passing with both hands		
every time	26	78,8
Sometimes	6	18,2
Never	1	3,0
8- Drills on passing with one hand		
every time	15	45,5
Sometimes	18	54,5
9-Bouncing pass drills		
Every time	17	51,5
Sometimes	15	45,5
Never	1	3,0
10- Drills on picking the ball off the floor		
Every time	24	72,7
Sometimes	9	27,3
11- Bounce stop drills		
every time	13	39,4
Sometimes	20	60,6
12- Dribbling drills		
every time	14	42,4
Sometimes	18	54,5
Never	1	3,0
13- Drills on two handed basket shooting		
Every time	16	48,5
Sometimes	11	33,3
Never	6	18,2
14- Drills on one handed basket shooting		
Every time	22	66,7
Sometimes	10	30,3
Never	1	3,0
15- Free throw shooting drills		
Every time	16	48,5
Sometimes	11	33,3
Never	6	18,2
16- Hook shot drills		
Every time	5	15,2
Sometimes	22	66,7
Never	6	18,2

17- Long distance shooting drills		
Every time	11	33,3
Sometimes	16	48,5
Never	6	18,2

Discussion

The study group consisted of wheelchair basketball players of the Turkish first and second league. The participants had disabilities due to poliomyelitis, spinal cord injury and limb amputation. This constellation of the study group is in accordance with the literature. (Nyland, Robinson, Caborn, Knapp, & Brosky, 1997; Burnham, Tuchak, Laskin, & Steadward, 1998). Although persons with spina bifida are well suited for wheelchair sports (Sherrill, 2004), there were no such participants in this study group. This may be due to the fact that shunt operation of persons with spina bifida has been conducted in Turkey only in the recent past. Thus, the number of wheelchair athletes in Turkey is expected to rise in the future.

70% of the study participants were polio survivors, which reflects the distribution in the Turkish leagues accurately. This high number is clearly a result of the fact that in Turkey many polio survivors exist in the age group 25-40 years. Polio survivors are different from persons with spinal cord injury, because they have no sensorial loss. Interestingly, this may produce an advantage in wheelchair basketball. (Agre & Rodriquez, 1991; Agre, Rodriquez, & Franke, 1997; Klein, Whyte, Keenan, Esquenazi, & Polansky, 2000; DiRocco, 1995; Sherrill, 2004). In the near future the number of Turkish persons with poliomyelitis is expected to decrease due to a nationwide vaccination program; and the number of persons with spinal cord injury and amputation is expected to increase due to traffic accidents. Such an evolution will inevitable be reflected in the participants of the Turkish Wheelchair Basketball Leagues. Some clubs have tried to gather players with identical etiology, but they were not successful.

Although most of the wheelchair basketball players participated in competitive play for longer than three years, the duration of their participation in regular training was less than three years. This finding is easily explained by the fact that due to the low number of the participants, some clubs were forced to integrate the players who may not have participate in regular training sessions.

The training load of wheelchair basketball players were clearly reduced due to inadequacy of sports and training facilities. Neither medical nor physical conditions were considered in the training programs. This led to the situation that most of the players could not train more than twice per week. For enhancing cardiopulmonary fitness in wheelchair sports, exercise sessions should occur 2-5 times per week (McArdle, Katch, & Katch, 1991; Davis & Ferrara, 1995; Stopka,1996-a; Horning, 2001) De Pauw & Gavron, (1995) suggested that for a successful training regime in elite athletes with disabilities a training frequency of 5-6 days per week is necessary. Labonowich (1998) recommended that for wheelchair basketball players each training session should last 2-3 hours with a total of at least 4-6 hours per week. Yilla (1997) has reported that the 1996 USA Men's Paralympic Wheelchair Basketball Team trained 8.20±4,91 hours per week for skill and 8.66±4,79 hours per week for fitness. Most of the participants in the present study did not reach this required level of training load. This would imply that the Turkish wheelchair basketball players were insufficiently trained.

The well known principle that the training load must be varied according to the phase of the season (pre-season, season and post-season) was violated in this study group (Kelley, & Freiden, 1980; Owen, 1982; Sharley, 1990; Green, 1999) Only few players trained before the season; most of the players started training a short time prior to the start of the season (3-4 weeks). This situation had adverse effects on performance and increased the incidence of injuries (Owen, 1982; Stopka, 1996-b; Green, 1999).

All players used warm-up exercises before the training, but most of them did not use cool-down exercises after the training session. It is obvious that this habit will have a negative impact both on health and performance of the players. (Owen, 1982; Green, 1999)

Only 2/3 of the participants in this study reported that they used basic stretching and flexibility exercises on the wheelchair. The non-systematic nature of this training will inevitable lead to lower performance and increase of incidence of injuries (Kelley & Freiden, 1980; Owen, 1982; Stopka, 1996-b; Green, 1999). None of the players used weight room training for the improvement of flexibility,

strength and endurance as it has been advised by many authors (Kelley & Freiden, 1980; Davis, Kofsky, Kelsey, & Shephard, 1981; Owen 1982; Davis & Shephard, 1990; McArdle, et al. 1991; Laskowski, 1994; O'Connell & Barnhart, 1995; Fallon 1995; Stopka, 1996-a; Stopka, 1996-b; Green, 1999; Horning, 2001; Billow, 2001; Rodgers, Keyser, Rasch, Gorman, & Russell, 2001; Horvat, Eichstaedt, Kalakain, & Croce, 2003; Keyser, Rasch, Finley, & Rodgers, 2003).
Most of the participants were polio survivors. Some researchers suggested that due to the post-polio syndrome and the associated loss of strength, these athletes would have less benefit from exercise and training (Peach, 1990; Sherrill, 2004). Other authors rejected this view and advised strength training for all (Agre & Rodriquez, 1991; Agre et al. 1997; Klein et al., 2000) or only for not affected muscle groups (Di Rocco (1995). In wheelchair basketball, the players need especially upper extremity and trunk strength. Since in all of the polio survivors of this study only the lower extremities were affected, it can be suggested that they engage in wheelchair basketball related resistance exercises. This also holds also true for endurance training.

Speed competitions on the court have also been advised for endurance training (Kelley & Freiden, 1980; Owen 1982; Labonowich, 1998). In this study only half of the participants reported that they performed such activities *every time*. This finding indicates that the participants did not use these exercises adequately for enhancing endurance.

Passing is a fundamental skill and should be incorporated in the training program (Kelley & Freiden, 1980; Owen 1982; ICC-WSOD, 1986; Labonowich, 1998; Zwakhoven et al, 2003; Davis & Sherrill 2004). The participants in this study reported a high rate of training exercises for passing; these consisted of passing with one hand, with both hands and bouncing passes. We think that passing is adequately trained.

Shooting baskets, free throws and hook shots are regarded as fundamental skills (Kelley & Freiden, 1980; Owen, 1982; ICC-WSOD, 1986; Gutmann (as cited in Yilla, 1997); Labonowich, 1998; Green, 1999; Malone et al. 2000; Nunome et al. 2002; Malone et al. 2002; Zwakhoven et al. 2003; Schwark, Mackenzie & Sprigings, 2004; Davis & Sherrill, 2004), but these were trained at varying frequencies. As the training did not include these exercises *every time*, it can be concluded that this inadequacy could negatively influence scoring in the match.

In the first five weeks of the 2003-2004 season, the 38 teams of Turkish wheelchair basketball leagues had a mean score of 56,43 ± 26,2 per match. One very strong team of the first division (mean score 126,2) raised the mean score of the whole group. It can be concluded that both the low training frequency and technical-tactical training deficiencies resulted in the overall low scoring.

One other fundamental skill of wheelchair basketball is picking the ball off the floor (Brasile, 1986; Zwakhoven, et al. 2003; Davis & Sherrill, 2004; Sherrill, 2004), which is also an important item of classification Nevertheless, only half of the participant in this study reported that they used this exercise in the training, which is obviously not sufficient.

Although dribbling was not practiced *every time* as it has been recommended in the literature (Kelley & Freiden, 1980; Owen, 1982; ICC-WSOD, 1986; Green, 1999; Gutmann (as cited in Yilla, 1997); Labanowich, 1998; Zwakhoven, 2003; Davis & Sherrill, 2004), it was nevertheless very frequently integrated in the training which is felt to be sufficient.

Touring on the court was practiced with high frequency, which has been recommended by many authors (Kelley & Freiden, 1980; Owen, 1982; Labonowich, 1998; Green, 1999).

The ability to fall and climb back on the wheelchair in an appropriate manner without help prevents injuries and is crucial for the progress of the game (Owen, 1982; ICC-WSOD, 1986). It was noticed that the players did not much knowledge or practice on this issue.

All of the players completed the training with a match as has been recommended by Labonowich (1998). Some teams also integrated technical drills and exercises, but generally after a short warm-up, a match completed the training.

Most of the players in this study ranged between 3 and 4 points according to the wheelchair basketball classification system. This is indicative of sufficient muscular strength to acquire match skills. Players

with 4.5 points are able to play only when they possess extraordinary game skills. The upper limit of total 14 points facilitates the incorporation of players with low-moderate classification scores and sufficient skills into the team. Regarding Turkey it should be emphasized that the constitution of wheelchair basketball teams is based on clubs and societies for persons with disabilities. In this context persons with a potential for 4.5 points in wheelchair basketball tend to socialize more in the general population.

The classification scores of the players will inevitable influence stability, fundamental and match skills like shooting performance. It is recommended that special exercises and skills should be integrated in the training to improve these skills in relation to the classification points. (Malone, 1999; Goosey et al 2002; Malone et al 2002; Vanlandewijck et al 2003). The participants in this study reported that they had no special training according to their classification scores. This result implies that players especially with low scores will experience difficulties in wheelchair and ball handling.

De Pauw & Gavron (1995) advised that trainers of wheelchair basketball need more formal education in workshops or certification routes. In Turkey the situation is worse, because there is indeed lack of qualified trainers with sports or training education in wheelchair basketball. Although there was some improvement on this issue, it continues to represent a major obstacle for the development of wheelchair basketball in Turkey. The players need more scientific based assistance for all training processes.

In conclusion the findings that training hours and days were not sufficient, endurance exercises were not emphasized, no special training programs existed in relation to classification scores or individual handicaps, cool-down was not performed after the training, no period specific training was instituted before, during and after the season, some technical drills and exercises were not practiced adequately, and most of the trainers had no adequate education were all factors that negatively influenced development, performance and health of Turkish wheelchair players..

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