

Wheelchair Basketball World Championships 2018 – Player Survey on Training Environment and Health Complaints

Rollstuhlbasketball Weltmeisterschaft 2018 – Befragung der Spieler zu Trainingsbedingungen und gesundheitlichen Problemen

Summary

- ▶ **Problem:** Little is known about health complaints and their prevention in elite wheelchair basketball. The study aimed to survey training environment and health complaints of elite wheelchair basketball players in the 12 months prior to the Wheelchair Basketball World Championships 2018 (WBWC).
- ▶ **Methods:** Players answered an anonymous retrospective questionnaire on match and training exposure, daily training environment, injury prevention as well as health problems and their implications in the 12 months before the WBWC.
- ▶ **Results:** In the 12 months prior the WBWC, 46.2% of athletes struggled at least sometimes with physical complaints, and 15.9% played often/always with pain or health complaints. Half of the players (50.8%) did not modify the volume of their training when having health complaints. Sixty percent of the athletes reported that injury prevention exercises were often or always part of their training. The overall training environment and national team support was rated as good or very good by 89.7% and 69.1% of players, respectively.
- ▶ **Discussion:** Prior to the world championships, wheelchair basketball players reported a high rate of pre-competition health complaints despite good training environment and the use of preventive strategies. Most players indicated they continued to play with pain and health complaints. Frequently playing with health complaints is known from other Olympic sports or pedestrian basketball. Prospective surveillance systems are needed to identify health complaints early and to examine efficiency of preventive measures in order to improve health and probably performance of wheelchair basketball players.

KEY WORDS:

Paralympic Sports, Sports Injury, Injury Prevention, Trainings Conditions, Elite Athletes

Zusammenfassung

- ▶ **Hintergrund:** Es ist bisher wenig über die Gesundheitsprobleme und Präventionsmaßnahmen im Rollstuhlbasketball bekannt. Daher wurden in dieser Studie die Spieler der Rollstuhlbasketball-Weltmeisterschaft (WM) 2018 zu Trainingsbedingungen, Betreuungssituation sowie gesundheitlichen Problemen in den 12 Monaten vor Beginn der WM befragt.
- ▶ **Methode:** Die Spieler beantworteten vor Beginn des Turniers freiwillig einen anonymen Fragebogen zu Spiel- und Trainingsexposition, Präventionsmaßnahmen sowie gesundheitlichen Beschwerden und deren Auswirkungen.
- ▶ **Ergebnisse:** In den 12 Monaten vor Beginn der WM hatten fast die Hälfte (46,2%) der Athleten manchmal oder häufiger gesundheitliche Probleme und 15,9% spielten oft oder immer mit Schmerzen oder Beschwerden. Die Hälfte aller Spieler (50,8%) hat den Trainingsumfang nicht angepasst, auch wenn gesundheitliche Probleme vorlagen. Sechzig Prozent der Spieler gaben an, dass regelmäßig oder immer Präventionsmaßnahmen in das Training integriert wurden. Die Trainingsbedingungen wurden von 89,7% als gut oder sehr gut empfunden, die Unterstützung der Nationalmannschaft von 69,1%.
- ▶ **Diskussion:** Vor der Rollstuhlbasketball-Weltmeisterschaft zeigten Nationalspieler trotz guter Trainingsbedingungen und genutzter Präventionsmaßnahmen eine hohe Rate an gesundheitlichen Problemen. Die meisten Spieler nahmen dabei trotz der Beschwerden unverändert am Trainings- und Spielbetrieb teil, was bereits in anderen olympischen Sportarten und Fußgänger-Basketball gezeigt wurde. Weitere prospektive Untersuchungen sind nötig um Gesundheitsprobleme früh zu erkennen und die Effektivität von Präventionsmaßnahmen zu überprüfen, um die Gesundheit und wahrscheinlich auch Leistung von Rollstuhlbasketballspielern langfristig zu verbessern.

SCHLÜSSELWÖRTER:

Paralympische Sportarten, Sportverletzungen, Verletzungsprävention, Trainingsbedingungen, Leistungssportler

Introduction

Wheelchair basketball follows the same rules as pedestrian basketball, but is played by athletes in wheelchairs due to inherited or acquired disabilities. In accordance with other Paralympic sports, athletes are classified according to their disability (21). An athlete's disability is rated between 1 (severe disability) and 4.5 (minor disability), and during a game the five players on the field are not allowed to have a

sum of more than 14. Thus, players with severe and minor disabilities can play together, and wheelchair basketball is considered to be an inclusive sport.

Few studies have investigated the injury epidemiology of wheelchair basketball during major tournaments (6, 12, 17, 23). The overall injury incidence rate ranged between 12 and 68 injuries per 1000 athlete hours (6, 12, 17, 23). The upper extremity and

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Table 1

Availability of coach and support staff in the 12 months prior to the Wheelchair Basketball World Championships 2018.

PROFESSION	NOT AVAILABLE	ONLY IF I PLAY	IF NEEDED	AT LEAST ONCE WEEK	AT EVERY TRAINING
Coach	6 (4.6%)	0	12 (9.2%)	16 (12.2%)	97 (74.0%)
Specialized Trainer	28 (21.7%)	9 (7.0%)	31 (24.0%)	44 (34.1%)	17 (13.2%)
Masseuse	30 (23.1%)	21 (16.2%)	42 (32.3%)	22 (16.9%)	15 (11.5%)
Physiotherapist	18 (13.8%)	8 (6.2%)	54 (41.5%)	28 (21.5%)	22 (16.9%)
Physician / Doctor	21 (16.3%)	11 (8.5%)	87 (67.4%)	7 (5.4%)	3 (2.3%)
Nutritionist	27 (20.9%)	21 (16.3%)	75 (58.1%)	5 (3.9%)	1 (0.8%)
Sport scientist	50 (38.8%)	24 (18.6%)	49 (38.0%)	4 (3.1%)	2 (1.6%)
Mental Coach / Psychologist	29 (22.5%)	11 (8.5%)	80 (62.0%)	8 (6.2%)	1 (0.8%)
Others	31 (86.1%)	1 (2.8%)	2 (5.6%)	0	2 (5.6%)

back were predominantly affected. More than half of the injuries were caused by overuse, and most acute injuries were incurred in contact with another player (12). Less is known about the risk factors for injuries and health complaints in wheelchair basketball, especially in consideration of underlying disabilities (7, 22). However, one preliminary study has shown that an injury prevention program focusing on strengthening and flexibility of the shoulder might potentially prevent shoulder injuries (24). Therefore, some recent advantages in the understanding and prevention of injuries in wheelchair basketball have been obtained.

However, only little is known about injuries and other health complaints outside major tournaments or about the training environment of elite athletes. Therefore, this study aimed to investigate the training environment and health complaints of national team wheelchair basketball players prior to a major tournament.

Methods

Study Design, Setting and Participants

A retrospective athlete's survey on health complaints in the four weeks prior and training environment in the 12 months prior to the WBWC was conducted. The overall study cohort consisted of 28 teams from 19 different countries with a total of 336 players (female: 12 teams with 144 players; male: 16 teams with 192 players). The WBWC was held from 16th to 26th of August 2018 in Hamburg, Germany.

Data Collection

For the data collection, athletes were asked to fill in an anonymous questionnaire (15). The paper based questionnaire consisted of several parts asking for player's demographics, match and training exposure, daily training environment, physical complaints and injury prevention in the last 12 months, as well as injuries and illnesses in the four weeks prior to the tournament. Players were asked to answer questions regarding the number of training sessions and matches, availability of support staff, physical complaints, how often they competed with complaints

or a diagnosed injury, and used exercises for injury prevention as part of their regular training during the last 12 months (15). For health complaint surveillance in the previous four weeks, participants were asked to fill out four questions on the "extent of injury, illness or other health problems" (based on the Oslo Sports Trauma Research Questionnaire (OSTRC) (2, 3). The OSTRC questionnaire has already been validated and applied to several different Olympic and Paralympic sports (10, 11, 14).

The study was introduced to the teams during the International Wheelchair Basketball Federation's team manager meeting, and a representative of each team was asked to dispense the questionnaires to all athletes. During the tournament members of the research team were present at the venue to collect the completed questionnaires in cooperation with the local organizing committee. Alternatively, team managers were offered to send the completed questionnaires via mail to the research team. The ethics committee of the University of Hamburg (protocol number AZ.2018_198) granted ethical approval for this study.

Data Analysis

All data was processed using Excel (for Mac 11, Version 14.7.1, Microsoft Cooperation, USA) and SPSS (V.23, IBM, USA). Results are described descriptively as means with standard deviation (SD) and range or percentages. Differences between groups (all players registered for the WBWC vs. participating players in the study, female vs. male players) were calculated using a chi square or t-tests. Relationship between disability classification or training load with struggle or playing with health complaints was investigated using Spearman correlation coefficients.

Results

Player Characteristics

Of 28 teams (336 players) participating in the WBWC, 19 teams (228 players) agreed to participate and distribute the questionnaires to their players. From these 228 players, 133 answered the questionnaire (response rate: 58.3%). The players from the responding sample differed with statistical difference from the overall population regarding sex ($p=0.0271$) and age ($p=0.0027$).

Table 2

Physical complaints in the 12 months prior to the Wheelchair Basketball World Championships 2018 according to groups of disability classifications.

DISABILITY CLASSIFICATIONS	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
1 (n=24)	0	10 (41.7%)	12 (50.0%)	1 (4.2%)	1 (4.2%)
1.5 (n=7)	1 (14.3%)	2 (28.6%)	2 (28.6%)	2 (28.6%)	0
2 (n=10)	2 (20.0%)	4 (40.0%)	4 (40.0%)	0	0
2.5 (n=12)	4 (30.8%)	4 (30.8%)	3 (23.1%)	1 (7.7%)	0
3 (n=20)	4 (20.0%)	10 (50.0%)	5 (25.0%)	0	1 (5.0%)
3.5 (n=7)	2 (28.6%)	2 (28.6%)	2 (28.6%)	0	0
4 (n=16)	7 (43.8%)	1 (6.3%)	6 (37.5%)	2 (12.5%)	0
4.5 (n=24)	3 (12.5%)	8 (33.3%)	7 (29.2%)	5 (20.8%)	1 (4.2%)
Overall (n=120)	23 (19.2%)	41 (34.2)	41 (34.2%)	11 (9.2%)	3 (2.5%)
Others	31 (86.1%)	1 (2.8%)	2 (5.6%)	0	2 (5.6%)

The participating 72 female (54.1%) and 61 (45.9%) male players were on average 27.4 years (SD= 6.25; range: 16-46) old. The most frequent disability classifications were 1.0 (n=24) and 4.5 (n=22), followed by 3.0 (n=20) and 4.0 (n=16). Most players reported to play in the positions forward (n=36) and guard (n=30). This study included players competing for ten of the 19 participating countries. Eight players (6.0%) lived and trained in another country than they competed for.

Trainings Environment

Athletes trained on average 4.9 days (SD=1.1; range:1-7) with 18.1 hours (SD=9.1; range: 2-60) per week during the season, 4.7 days (SD=1.4; range:1-7) with 15.8 hours (SD=9.0; range: 2-60) per week during pre-season, and 3.5 days (SD=4.9; range:0-6) with 9.1 hours (SD=6.3; range: 0-24) per week during other times/holidays in the last 12 months. In this time frame, they competed on average in 19.2 (SD=12.3; range: 1-50) international and 22.6 (SD=11.7; range: 1-60) national matches. Coach and support staff availability is shown in Table 1.

Almost 80% of the players rated their training environment either as very good (n=51; 38.3%) or good (n=55; 41.4%). Twenty (15.0%) players rated it as sufficient, six (4.5%) as poor and one (0.8%) as very poor. Two thirds rated the support offered by their national team program very good (n=43; 32.3%) or good (n=49; 36.8%), while one third rated it as sufficient (n=28; 21.1%) poor (n=10; 7.5%) or very poor (n=3; 2.3%).

Physical Complaints and Injury Prevention

In the 12-month-period prior to the WBWC, about more than half of the players never (n=23; 17.4%) or seldom (n=48; 36.4%) struggled with physical complaints. However, a third (n=44; 33.3%) reported to have sometimes physical complaints, eleven (8.3%) often, three very often and three always (2.3%). Nineteen athletes (14.4%) stated to never play with pain or other complaints. About a third (n=47; 35.6%) played seldom and another third (n=45; 34.1%) sometimes with pain or other complaints. About every sixth player played often (n=15; 11.4%), very often

(n=3; 2.3%) or always (n=3; 2.3%) with pain or other complaints. More than 20% of the players reported that exercises for injury prevention were never (n=12; 9.2%) or seldom (n=18; 13.7%) a regular part of their daily training. In their regular training, about 40% used exercises for injury prevention sometimes (n=24; 18.3%) or often (n=29; 22.1%), and more than a third always (n=47; 37.9%).

No differences between female and male players were found with regard to struggle with (p=0.662) or participation with physical health complaints (p=0.245). The number of international games (r=0.248; p=0.004) and overall games (r=0.232; p=0.009) was positively correlated with struggle with health complaints. There was no correlation between number of national games and health complaints (r=0.119; p=0.196). The weekly training load in hours was negatively correlated with struggle with health complaints (r=-0.178; p=0.043). Furthermore, no significant correlation between player's classification and struggle with (r=-0.03; p=0.726) or participation with physical health complaints (r=-0.05; p=0.606) was found. Struggle with physical complaints and participation with pain or complaints according to the different disability classifications can be found in Tables 2 and 3.

Health Complaints in the Four Weeks Prior to the WBWC

When asked for difficulties participating in normal training and competition due to health complaints in the four weeks prior to the WBWC, 81 (61.5%) players had no health complaints. Every fourth to fifth player (n=31; 23.7%) participated fully, but with a health complaint. Seventeen players (13.0%) reduced participation due to a health complaint, and two (1.5%) could not participate due to a health complaint. Four out of five players with health complaints (n=39; 78.0%) did modify the volume, content or intensity of their training volume due to the injury, illness or other health problems. About a quarter (n=21; 42.0%) did modify it to a minor extent, 14 (28.0%) to a moderate and 2 (4.0%) to a major extent. Two (4.0%) athletes could not participate at all. Ten percent of the players with health complaints (n=5) >

Table 3

Participation with pain or health complaints at training or games in the 12 months prior to the Wheelchair Basketball World Championships 2018 according to groups of disability classifications

DISABILITY CLASSIFICATIONS	NEVER	SELDOM	SOMETIMES	OFTEN	VERY OFTEN
1 (n=24)	2 (8.3%)	6 (25.0%)	13 (54.2%)	2 (8.3%)	1 (4.2%)
1.5 (n=7)	0	3 (42.9%)	0	3 (42.9%)	0
2 (n=10)	4 (40.0%)	4 (40.0%)	1 (10.0%)	1 (10.0%)	0
2.5 (n=12)	3 (23.1%)	3 (23.1%)	5 (38.5%)	0	1 (7.7%)
3 (n=20)	3 (15.0%)	8 (40.0%)	7 (35.0%)	2 (10.0%)	0
3.5 (n=7)	3 (42.9%)	1 (14.3%)	2 (28.6%)	1 (14.3%)	0
4 (n=16)	2 (12.5%)	7 (43.8%)	6 (37.5%)	0	1 (6.3%)
4.5 (n=24)	2 (8.3%)	10 (41.7%)	6 (25.0%)	6 (25.0%)	0
Overall (n=120)	19 (15.8%)	42 (35%)	40 (33.3%)	15 (12.5%)	3 (2.5%)
Others	31 (86.1%)	1 (2.8%)	2 (5.6%)	0	2 (5.6%)

reported no effect of an injury, illness or other health problems on their performance in the four weeks prior the current championships. Two thirds of the players (n=32; 64.0%) reported minor, 12 (24.0%) moderate and one (2.0%) major effects of health problems on their performance. About a quarter of these players (n=11; 22.4%) had experienced no symptoms/health problems. Twenty-seven athletes (55.1%) reported minor, eight (16.3%) moderate and three (6.1%) severe symptoms/health problems.

Asked what had bothered them the most in the four weeks before the WBWC, one third of athletes ticked that they were overloaded by the combination of work/school and training/competition (n=48; 36.4%), followed by injury/physical complaints (n=39; 29.5%), and personal problems in their relationship/family (n=35; 26.5%). Low performance (n=21; 15.9%), mental health problems (n=19; 14.4%), press, media, public pressure (n=18; 13.4%) affected more athletes than illness (n=15; 11.4%), too little support by the coach/conflicts with the coach (n=13; 9.8%), conflicts within the team (n=9; 6.8%) or financial problems (n=9; 6.8%).

Discussion

This is the first survey of elite wheelchair basketball players on training load and health complaints prior to a major tournament. The training environment and national team support was predominantly rated as good or very good. However, almost half of the players that qualified for the tournament struggled with health complaints and about a third played with these prior to the WBWC. One third of them reported effects of health complaints on their performance. Eighty percent of the players included injury prevention exercises in their regular training routine.

An athlete survey has rarely been implemented in wheelchair basketball players in the last three decades (4, 20) except for developmental differences between different disabilities (5). Therefore, comparison with other studies about wheelchair

basketball is difficult. Likewise, the comparison to other Paralympic sports is difficult due to differences in pre-existing disabilities (7, 8).

One of the main findings of this survey was that more than one third of athletes reported health complaints in the four weeks prior to the study and one fourth played or trained with pain or health complaints. In accordance, for the 2016 Rio Olympic Games also a high pre-competition injury rates have been reported (6). Furthermore, about the same number (39%) of elite pedestrian basketball players stated to play with health complaints (18). In their survey, Schneider et al. (2019) (18) elite player stated that they would compete with joint pain (42% agreed), cold with fever (66% agreed) and when their physician tells them too (79% agreed). From our data, it cannot be derived whether the decision to play with a health complaint was upon consultation with the medical team. However, Schneider et al. (2019) (18) highlight that physicians (family and team physicians) play a central role in the decision whether or not to play with injuries or illnesses. From our study, the availability of specialized medical staff was very different for players (Table 1).

A positive finding of this survey was that injury prevention was always or often part of the training routine in about more than half of the athletes. Shoulder injury prevention focusing on flexibility and strength has already been shown to successfully reduce the risk of injuries in a pilot study (24). However, this study's questionnaire did not enable conclusions about the characteristics of the used injury prevention programs and misperceptions of effective preventions strategies are known in other sports (26). To date, only few studies have documented the injury epidemiology in wheelchair basketball players and the etiology is still relatively vague (6, 9, 12, 17, 23). Therefore, more efforts are needed to understand the underlying mechanism of injuries in conjunction with the different disabilities in wheelchair basketball players to develop adequate and evidence-based prevention strategies (1).

A relatively high grade of professionalism of wheelchair basketball can be derived from this study. Several specialized professions (coaches, specialized trainers, massage therapists and physiotherapists) were available for most of the players most of the time. Sport scientists, sport psychologist and nutritionists were available on demand. Only 14-16% of players had no access to medical professionals. The players trained on average about 18h per week, but the range (2-60h) was very large. While an increasing number of weekly training hours was correlated with less health complaints, more international and overall games were associated with more health complaints. Taking the high number of health complaints and training extent together, a future area for wheelchair basketball (and Paralympic sports) research could be the load management which has been in the focus of Olympic sports (19).

Some points limit the generalizability of our findings. Due to the cross-sectional and retrospective character of this study, no causal relationships can be derived. Even though the study cohort consisted of a high-level cohort of national team players, one cannot extrapolate them to all wheelchair basketball players. In addition, having a response rate of 58.3% (41.3% of the overall population) and differences in general variables (sex and age) does suggest that the participating players might not be representative for the whole population. Only investigating players that qualified and participated at the WBWC, might underestimate the overall prevalence of health complaints. Moreover, it is not clear whether some of the health complaints are results of an injury or related to the disability. Further research is needed to prospectively monitor injuries and illnesses in wheelchair basketball and understand the probably multifactorial etiology as already established in other (primarily able-bodied) sports (1, 13, 14, 16, 25). In addition, more data is needed to look at injury and illness differences in subgroups according to disability classification and playing position.

Conclusion

This study was the first to survey training environment and health complaints of elite wheelchair basketball players prior to a major tournament. While most players rated their training environment and team support as good or very good and already implemented an injury prevention program, pre-competition health complaints were reported by almost 38.5% of the players. Most players indicated to continue to play with pain and health complaints. ■

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Ethical Approval Information

Ethical approval has been obtained from the local ethics committee of the University of Hamburg (protocol number AZ 2018_198).

Conflict of Interest

The authors have no conflict of interest.

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