MINH
MALAHAYATI INTERNATIONAL JOURNAL OF NURSING AND HEALTH SCIENCE
ISSN 2620-9152 (Print)
ISSN 2621-4083 (Online)
DOI: 10.33024
Nomor: 79/E/KPT/2023

ARTICLE INFORMATION
Received: November, 16, 2023
Revised: December, 21, 2023
Available online: December, 25, 2023
at : http://ejurnalmalahayati.ac.id/index.php/nursing/index

Injuries among wheelchair basketball players: A systematic review

Novita Sri Wulandari[1], Suryo Saputra Perdana[1]*, Amalia Nur Azizah[2]

[1]Prodi Fisoterapi, Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta, Indonesia.
[2]Physiotherapy Departement, National Paralympic Committee
Corresponding author: *E-mail: suryo.saputra@ums.ac.id

Abstract

Background: Injuries in wheelchair basketball athletes have detrimental physical and psychological impacts on sports performance. There are numerous injuries occurring during wheelchair basketball games, be it during practice, competitions, or post-events.
Purpose: This research aims to determine the frequently occurring injuries among wheelchair basketball athletes.
Method: A systematic search was conducted across five databases (PubMed, Google Scholar, Science Direct, Web of Science, and Sports Discus). A systematic review was conducted on Cross-Sectional Studies, and the study quality assessment was performed using NIH.
Results: From the systematic review of 5 articles, it indicated that the commonly occurring injury rate focused on the sacral area, accounting for 19.3%.
Conclusion: Efforts to reduce the risk of injuries in athletes, particularly in the sacral area, can enhance their quality of life and their ability to achieve better outcomes.

Keywords: Incidence Rate; Parasport Injuries; Wheelchair Athlete; Wheelchair Basketball.

INTRODUCTION

Wheelchair basketball in the Paralympics consists of two teams with five athletes in each team, categorized into eight different classes based on their disabilities (Najafabadi, Shariat, Anastasio, Khah, Shaw, & Kavianpour, 2023). Wheelchair basketball gained popularity after World War II ended as it was used as rehabilitation for war veterans (Ferreira, Souza, Nascimento, Tartaruga, Portela, Mascarenhas, & Queiroga, 2017). It has consistently been a part of the Paralympics and is increasingly popular. Lower limb impairments in wheelchair basketball athletes are often due to spina bifida, cerebral palsy, amputations, or congenital dysmelia (Bosma & Van Yperen, 2020). Due to direct contact with opponents and the involvement of the body in the game, wheelchair basketball athletes are highly susceptible to sports injuries.

Sports injuries are prevalent among athletes during training, competition, or post-exercise. In serious cases, sports injuries can end an athlete's career (Ristolainen, Kettunen, Kujala, & Heinonen, 2012). There are three types of sports injuries: (1) Acute, where athletes experience minor complaints. (2) Sub-acute refers to the stage where athletes start experiencing pain, swelling, functional impairments (signs of inflammation) affecting their performance, such as muscle width, muscle strain, tendon, ligament tears (grade II sprains). (3) Chronic, at this stage, athletes require intensive care, complete rest, and may need surgical treatment if there's a complete or nearly complete ligament tear (grade III

DOI: https://doi.org/10.33024/minh.v6i6.13024

sprain) and bone fractures or ligament fractures (Lätti, Pekkanen, & Koskela, 2018).

In the Paralympics, the incidence of injuries is twice as high as in the Olympics (Pinheiro, Ocarino, Madaleno, Verhagen, de Mello, Albuquerque, & Resende, 2021). It was reported that there were 34 injuries in London in 2012, where 65% of them were acute injuries and 23% were due to overtraining (Willick, Webborn, Emery, Blauwet, Pit-Grosheide, Stomphorst, & Schwellnus, 2013). Basketball players are among the athletes with the highest number of injuries in wheelchair basketball. In 2012, there were 12.0 injuries/1000 athletes per day, and in 2016, there were 12.8 injuries/1000 athletes per day (Hollander, Kluge, Glöer, Riepenhof, Zech, & Junge, 2020).

Based on the above explanations, this study aims to determine the commonly occurring injuries in wheelchair basketball athletes.

RESEARCH METHOD

To conduct a systematic review, Prisma (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) was used in this research.

The research was identified through PubMed, Google Scholar, Science Direct, Web of Science, and Sports Discus. The following terms were used to search all databases: “wheelchair basketball”, “parasport injuries”, “incidence rate”, “wheelchair athlete”.

The inclusion criteria in this study were the screening identification results: (1) involving wheelchair basketball athletes, (2) articles written in English, (3) presenting numerical data about wheelchair basketball injuries. Meanwhile, the exclusion criteria for this study were as follows: (1) duplicate studies and (2) studies related to wheelchair basketball that do not discuss the incidence or prevalence of injuries.

Data were independently extracted from the articles to be reviewed by examining the authors, study design, purposes, samples, the number of injured athletes, and the most frequent injury incidents. The extracted data results were reviewed by two reviewers.

The assessment of studies in this research used the NIH (Sport Injury and Illness Surveillance). This tool consists of 14 indicator items aimed at evaluating the rigor of research methodology. These items were used to report observational studies on injuries and illnesses in sports. Additionally, this tool was considered appropriate for assessing epidemiological studies on sports injuries and illnesses.

Novita Sri Wulandari[1], Suryo Saputra Perdana[1]*, Amalia Nur Azizah[2]

[1]Prodi Fisoterapi, Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta, Indonesia.
[2]Physiotherapy Departement, National Paralympic Committee
Corresponding author: *E-mail: suryo.saputra@ums.ac.id

DOI: https://doi.org/10.33024/minh.v6i6.13024

RESEARCH RESULTS

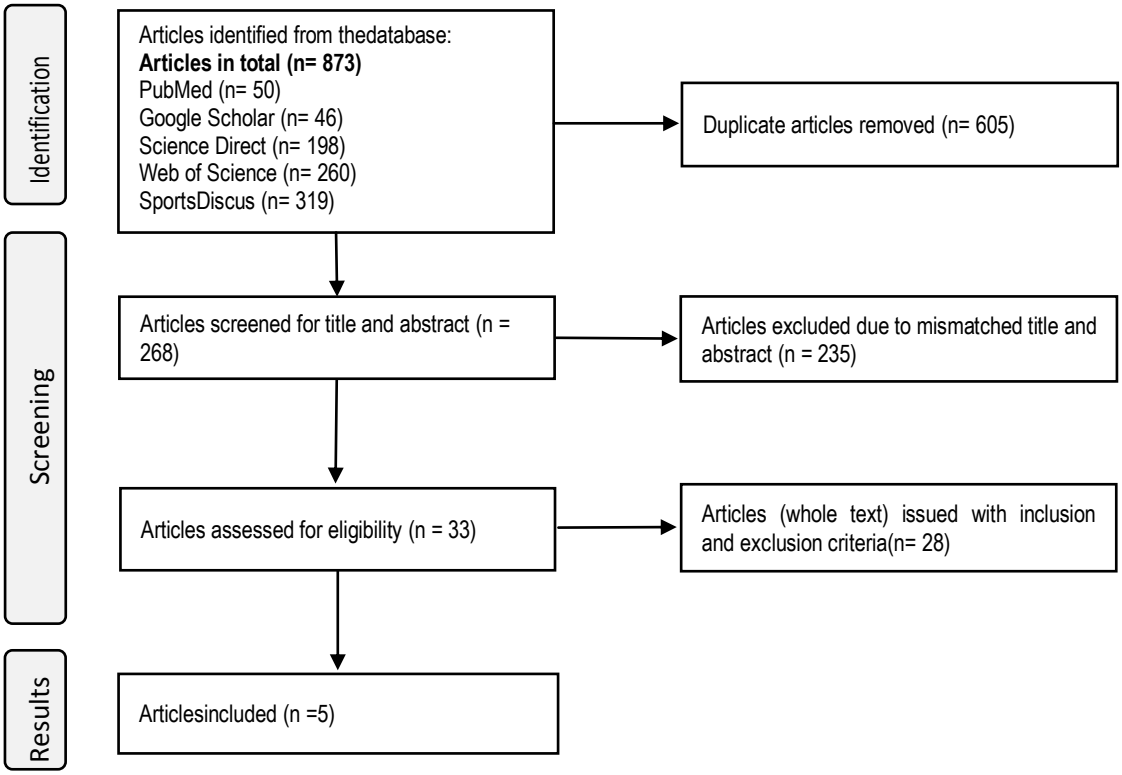

Figure1. Articles' searching and selection

In Figure 1, it shows a search of 873 articles from five databases, then selected based on title and abstract to obtain 268 articles. Further article selection involved choosing those that met the requirements, resulting in 33 articles. Then, another round of selection was conducted applying inclusion and exclusion criteria, resulting in 5 articles selected for analysis.

Novita Sri Wulandari[1], Suryo Saputra Perdana[1]*, Amalia Nur Azizah[2]

[1]Prodi Fisoterapi, Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta, Indonesia.
[2]Physiotherapy Departement, National Paralympic Committee
Corresponding author: *E-mail: suryo.saputra@ums.ac.id

DOI: https://doi.org/10.33024/minh.v6i6.13024

Table 1. Results Analysis of The Selected Articles

Author, Year	Research Design	Purposes	Number of Injured Athletes	Most Frequent Injury Incidents
Rocco, & Saito,2006	Cross-sectional Study	Finding out what sports injuries basketball wheelchair players are most likely to suffer.	20 athletes	Shoulder: (n=8; 40%) Arm: (n=3; 15%) Neck: (n=2; 10%) Elbow: (n=2; 10%) Knee: (n=3; 15%) Ankle: (n=2; 10%)
Mutsuzaki, Tachibana,Shimizu ,Hotta, Fukaya, Karasawa, & Wadano, 2014.	Cross-sectional Study	Investigating injured tissue in male WB players using ultrasound to identify risk factors for injury	9 athletes	Sacral: (n=7; 77%) Ischium: (n=2; 22%)
Shimizu,Mutsuzaki ,Tachibana,Tsunod a, Hotta, Fukaya, & Wadano, 2017	Cross-sectional Study	Deeper investigation of injury networks in elite WB players, and identification of risk variables for these injuries.	22 athletes	Sacral: (n=10; 45.45%) Ischium:(n=12; 54.55%)
Huzmeli, Katayifci, & Hallaceli, 2017	Cross-sectional Study	To ascertain the frequency and type of injuries among wheelchair athletes.	12 athletes	Shoulder: (n=3; 25%) Hand: (n=2; 16.6%) Arm: (n=2; 16.6%) Forearm: (n=3; 25%) Knee: (n=1; 8.3%) Neck: (n=1; 8.3%)
Hoo,Latzka,& Harrast, 2019	Cross-sectional Study	An evaluation of the nature of para-athletes who participate in sports clubs, their training regimens, and the injuries they suffer, as well as the type of medical attention they receive and the frequency of spasticity they suffer.	25 athletes	Shoulder: (n=5; 20%) Elbow: (n=2; 8%) Wrist: (n=6; 24%) Hand: (n=2; 8%) Finger: (n=4; 16%) Head: (n=1; 4%) Face: (n=1; 4%) Back: (n=2; 8%) Knee: (n=1; 4%) Rib: (n=1; 4%)

In Table 1, out of the 5 articles, studies using a cross-sectional design discussing the incidence or prevalence of injuries were utilized. Based on the systematic review, a total of 88 respondents were identified.

Novita Sri Wulandari[1], Suryo Saputra Perdana[1]*, Amalia Nur Azizah[2]

[1]Prodi Fisoterapi, Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta, Indonesia.
[2]Physiotherapy Departement, National Paralympic Committee
Corresponding author: *E-mail: suryo.saputra@ums.ac.id

DOI: https://doi.org/10.33024/minh.v6i6.13024

Table 2. The Prevalence of Injuries (N=88)

Parts of The Body	Number of Injuries (n/%)
Sacral	17/19,3
Shoulder	16/18,1
Ischium	14/15,9
Wrist	6/6,8
Knee	5/5,7
Arm	5/5,7
Hand	4/4,6
Finger	4/4,6
Elbow	4/4,6
Neck	3/3,4
Forearm	3/3,4
Ankle	2/2,3
Back	2/2,3
Head	1/1,1
Face	1/1,1
Rib	1/1,1

In Table 2, it shows that injuries were found in the sacral bone (sacrum) at 19.3%, shoulder injuries at 18.1%, ischium bone injuries at 15.9%, wrist injuries at 6.8%, knee injuries at 5.7%, arm injuries at 5.7%, hand injuries at 4.6%, finger injuries at 4.6%, elbow injuries at 4.6%, neck injuries at 3.4%, upper arm injuries at 3.4%, thigh injuries at 2.3%, back injuries at 2.3%, head injuries at 1.1%, facial injuries at 1.1%, and rib injuries at 1.1%.

.

DISCUSSION

The purpose of this analysis is to identify common injuries among wheelchair basketball athletes (WB). Data from 5 collected and systematically reviewed articles indicate that the most frequently injured areas are the sacral region (19.3%), followed by the shoulder (18.1%) and the ischium (15.9%).

Injuries can occur due to rapid repetitive exercises, damaging tissues or disrupting normal function (International Olympic Committee Injury and Illness Epidemiology Consensus Group, Bahr, Clarsen, Derman, Dvorak, Emery, & Chamari, 2020). The risk of sports injuries in female athletes might be associated with menstrual dysfunction, and low bone density correlated with repeated injuries in female athletes (Daily, & Stumbo, 2018; Loveless, 2017). Differences in estrogen and relaxin activities can also cause joint instability and ligament weakness during sports, leading to injuries (Saremi, Yavarikia, & Jafari, 2016).

Wheelchair basketball sports injuries are classified into traumatic or overuse categories, caused by a specific identifiable event occurring through contact or non-contact (Verhagen, & Van Mechelen, 2010). In basketball injuries, injury incidents can be influenced by sports biomechanics (Wilroy, & Hibberd, 2018). Traumatic injuries can be caused by the repetitive use of the shoulders. Sports biomechanics can help minimize injuries and enhance performance (Morriën, Taylor, & Hettinga, 2017).

The most common injuries in wheelchair basketball occur in the spinal area due to extended sitting (Li, Chen, Chang, & Tsai, 2014). Inactive physical activity, muscle inactivity, and neuropathy are factors leading to spinal discomfort (Kovacs, Seco, Royuela, Barriga, & Zamora, 2018). Preventing discomfort in these conditions is crucial as it negatively impacts the quality of life and changes in physical activity positioning.

Analyzing injuries occurring in wheelchair basketball can serve for preventive purposes, but also for planning medical services and preparing adaptive equipment. The limitation of this study lies

Novita Sri Wulandari[1], Suryo Saputra Perdana[1]*, Amalia Nur Azizah[2]

[1]Prodi Fisoterapi, Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta, Indonesia.
[2]Physiotherapy Departement, National Paralympic Committee
Corresponding author: *E-mail: suryo.saputra@ums.ac.id

DOI: https://doi.org/10.33024/minh.v6i6.13024

in the limited number of studies discussing injuries in WB athletes, resulting in a scarcity of journals available for analysis.

CONCLUSION

In this systematic review study, it was found that several body parts of wheelchair basketball athletes commonly experience injuries in the sacral area. In the future, the findings of this study can be used as comparative and evaluative material for coaches, wheelchair basketball athletes, and medical teams. It is hoped that this research can help minimize athlete injuries, leading to a better quality of life for them.

REFERENCES

Bosma, N., & Van Yperen, N. W. (2020). A quantitative study of the impact of functional classification on competitive anxiety and performance among wheelchair basketball athletes. Frontiers in Psychology, 11, 558123.

Daily, J. P., & Stumbo, J. R. (2018). Female athlete triad. Primary Care: Clinics in Office Practice, 45(4), 615-624.

Ferreira, S. A., Souza, W. C. D., Nascimento, M. A. D., Tartaruga, M. P., Portela, B. S., Mascarenhas, L. P. G., & Queiroga, M. R. (2017). Morphological characteristics, muscle strength, and anaerobic power performance of wheelchair basketball players. Revista Brasileira de Cineantropometria & Desempenho Humano, 19, 343-353.

Hollander, K., Kluge, S., Glöer, F., Riepenhof, H., Zech, A., & Junge, A. (2020). Epidemiology of injuries during the wheelchair Basketball world Championships 2018: a prospective cohort study. Scandinavian journal of medicine & science in sports, 30(1), 199-207.

Huzmeli, E. D., Katayifci, N., & Hallaceli, H. (2017). Injuries in wheelchair basketball players. New Trends and Issues Proceedings on Advances in Pure and Applied Sciences, 8, 29-35.

International Olympic Committee Injury and Illness Epidemiology Consensus Group, Bahr, R., Clarsen, B., Derman, W., Dvorak, J., Emery, C. A., & Chamari, K. (2020). International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sports 2020 (including the STROBE extension for sports injury and illness surveillance (STROBE-SIIS). Orthopaedic journal of sports medicine, 8(2), 2325967120902908.

Kovacs, F. M., Seco, J., Royuela, A., Barriga, A., & Zamora, J. (2018). Prevalence and factors associated with a higher risk of neck and back pain among permanent wheelchair users: a cross-sectional study. Spinal cord, 56(4), 392-405.

Lätti, A. M., Pekkanen, J., & Koskela, H. O. (2018). Defining the risk factors for acute, subacute and chronic cough: a cross-sectional study in a Finnish adult employee population. BMJ open, 8(7), e022950.

Li, C. T., Chen, Y. N., Chang, C. H., & Tsai, K. H. (2014). The effects of backward adjustable thoracic support in wheelchair on spinal curvature and back muscle activation for elderly people. PloS one, 9(11), e113644.

Loveless, M. B. (2017). Female athlete triad. Current Opinion in Obstetrics and Gynecology, 29(5), 301-305.

Morriën, F., Taylor, M. J., & Hettinga, F. J. (2017). Biomechanics in paralympics: implications for performance. International journal of sports physiology and performance, 12(5), 578-589.

Mutsuzaki, H., Tachibana, K., Shimizu, Y., Hotta, K., Fukaya, T., Karasawa, M., & Wadano, Y. (2014). Factors associated with deep tissue injury in male wheelchair basketball players of a Japanese national team. Asia-Pacific Journal of Sports Medicine, Arthroscopy, Rehabilitation and Technology, 1(2), 72-76.

Novita Sri Wulandari[1], Suryo Saputra Perdana[1]*, Amalia Nur Azizah[2]

[1]Prodi Fisoterapi, Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta, Indonesia.
[2]Physiotherapy Departement, National Paralympic Committee
Corresponding author: *E-mail: suryo.saputra@ums.ac.id

DOI: https://doi.org/10.33024/minh.v6i6.13024

Najafabadi, M. G., Shariat, A., Anastasio, A. T., Khah, A. S., Shaw, I., & Kavianpour, M. (2023). Wheelchair basketball, health, competitive analysis, and performance advantage: a review of theory and evidence. Journal of Exercise Rehabilitation, 19(4), 208.

Pinheiro, L. S. P., Ocarino, J. M., Madaleno, F. O., Verhagen, E., de Mello, M. T., Albuquerque, M. R., & Resende, R. A. (2021). Prevalence and incidence of injuries in para athletes: a systematic review with meta-analysis and GRADE recommendations. British journal of sports medicine, 55(23), 1357-1365.

Ristolainen, L., Kettunen, J. A., Kujala, U. M., & Heinonen, A. (2012). Sport injuries as the main cause of sport career termination among Finnish top-level athletes. European Journal of Sport Science, 12(3), 274-282.

Rocco, F. M., & Saito, E. T. (2006). Epidemiology of sportive injuries in basketball wheelchair players. Acta Fisiátrica, 13(1), 17-20.

Saremi, H., Yavarikia, A., & Jafari, N. (2016). Generalized ligamentous laxity: an important predisposing factor for shoulder injuries in athletes. Iranian Red Crescent Medical Journal, 18(6).

Shimizu, Y., Mutsuzaki, H., Tachibana, K., Tsunoda, K., Hotta, K., Fukaya, T., & Wadano, Y. (2017). A survey of deep tissue injury in elite female wheelchair basketball players. Journal of back and musculoskeletal rehabilitation, 30(3), 427-434.

Soo Hoo, J. A., Latzka, E., & Harrast, M. A. (2019). A descriptive study of self-reported injury in non-elite adaptive athletes. PM&R, 11(1), 25-32.

Verhagen, E., & Van Mechelen, W. (Eds.). (2010). Sports injury research (Vol. 16, No. 1). Oxford University Press.

Willick, S. E., Webborn, N., Emery, C., Blauwet, C. A., Pit-Grosheide, P., Stomphorst, J., & Schwellnus, M. (2013). The epidemiology of injuries at the London 2012 Paralympic Games. British journal of sports medicine, 47(7), 426-432.

Wilroy, J., & Hibberd, E. (2018). Evaluation of a shoulder injury prevention program in wheelchair basketball. Journal of sport rehabilitation, 27(6), 554-559.

Novita Sri Wulandari[1], Suryo Saputra Perdana[1]*, Amalia Nur Azizah[2]

[1]Prodi Fisoterapi, Fakultas Ilmu Kesehatan Universitas Muhammadiyah Surakarta, Indonesia.
[2]Physiotherapy Departement, National Paralympic Committee
Corresponding author: *E-mail: suryo.saputra@ums.ac.id

DOI: https://doi.org/10.33024/minh.v6i6.13024