

Preventing Injuries Among Water Polo Players: A quantitative Survey

GUILLERMO DE CASTRO-MAQUEDA¹, FLAVIA ESTEFANIA AMAR-CANTOS²

^{1,2}Department of teaching physical education. University of Cadiz SPAIN

Published online: July 31, 2019

(Accepted for publication: July 10, 2019)

DOI:10.7752/jpes.2019.s4216

Abstract: The aim of this study was to investigate the most frequent water polo injuries and players' perception regarding the current state of injury treatment and preventative programs.

Problem of statement: In the field of aquatic sports and water polo, in particular, little has been done to examine the player's perception regarding the injuries, health hazards, causes and ways of preventing these injuries. However, many researchers have conducted systemic reviews and theory-based studies on the same issues. These studies are inadequate and insufficient in solving the problems of injuries in the water polo matches. Therefore, there is need to conduct additional quantitative studies to supplement the theory-based and systemic review studies regarding injuries during water polo game and training sessions. This need necessitated the conduction of this study with the intent of examining the player's perception regarding the levels of injuries, causes and prevention measures in water polo sports activities.

Method: The study involved a quantitative study design with 487 water polo players in the sample. These participants were required to complete an online survey.

Results: 98.4%, 87% and 56% of the respondents reported having had Shoulder pain, sunburns, and groin pain at one point in their water polo playing and training life. 52% of respondents said they had protective gears on at the time the injury occurred. 61.3%, 16.3%, and 8.7% said that the current preventative and treatment programs are satisfactory, inadequate and needed improvement respectively.

Conclusion: The current water polo injury treatment and preventative measures and inadequate and needs improvement. These improvements should focus on regulating pool water temperature, enhancing the quality of protective gears and patient-centered care to victims of severe fractures and hypothermia.

Key Words: Prevention, injuries, aquatic sports, pains, water polo

Introduction

This study intended to investigate the most frequent water polo injuries and players' perception regarding the current state of injury treatment and preventative programs. In brief, Water Polo is a type of aquatic sports activity that involves two teams playing against each other in a pool. The game was first developed by William Wilson in 1900 (McMaster, Long & Caiozzo, 1991). William wrote first set of rules for the game (Platanou & Geladas, 2006). In this sporting activity, the players attempt to throw a ball past the goal of the opponent. Each team comprised of seven players, a goalkeeper and six field players. In this game, the goal posts are located on either end of the pool. A goalkeeper is the custodian of the goal and does not engage in the in-water defensive or offensive activities (Whiting et al., 1985). The winner is determined after four quarters, with each section lasting eight minutes only. The team that scores the highest number of goals in a majority of the quarters becomes the winner (Lozovina, Pavicic & Lozovina, 2004).

The need to conduct this study is informed by the many cases of injury during the water polo game. In the past, many players have experienced short-term and long-term injuries during the water polo games (Doney & Aleksandrovic, 2008). One example of these notable injuries include the 1956 blood in water match. This game was between Russia and Hungary (Rinehart, 1996). During the match, a Russian player physically assaulted his Hungarian opponent, injuring him right above his eye. After a short while, the pool was red due to excessive bleeding (Rinehart, 1996). Since then, many cases of injuries have occurred during water polo matches and in training times. As a result, many researchers have invested their financial and time resources in examining the causes of water polo injuries and how to prevent them. However, there is little done to assess the player's perception regarding the causes of injuries during water polo matches and possible means of preventing these injuries. Similarly, these studies have done little in conducting quantitative studies to verify their hypotheses and theoretical literature. For this reason, this study is needed to bridge these gaps in water polo's literature.

In the field of aquatic sports and water polo, in particular, little has been done to examine the player's perception regarding the injuries, health hazards, causes and ways of preventing these injuries. However, many researchers have conducted systemic reviews and theory-based studies on the same issues. These studies are inadequate and insufficient in solving the problems of injuries in the water polo matches. Therefore, there is need to conduct additional quantitative studies to supplement the theory-based and systemic review studies regarding

1496-----

Corresponding Author: GUILLERMO DE CASTRO-MAQUEDA, E-mail: guillermoramon.decastro@uca.es

injuries during water polo game and training sessions. This need necessitated the conduction of this study with the intent of examining the player's perception regarding the levels of injuries, causes and prevention measures in water polo sports activities.

Material & methods

This study used a quantitative research design. The researchers then used a purposive sample. The study used an online questionnaire for the data collection process.

Population- The larger target population include all water polo players from around Europe. These players are eighteen years and above and who have either participated in a local, national or international matches and have had an injury during training or match sessions. Players who have witnessed a friend have an injury in the defined environment and setting were also eligible for the population. The findings of the study are generalized to apply in the cases of players in the future.

Sample- A total of 500 questionnaires were dispatched online. Out of the 500 surveys, 497 were completed and returned in the given time frame. Ten studies were dropped for having inconsistent information or having been partially completed. Therefore, the final sample size included 487 players (n=487) from around Europe. These players were all eighteen years and above and filled an online questionnaire. The respondents must have participated in a water polo match for the period between 2007 and 2017, a timeframe of 10 years. Players who participated in these sports for an earlier period were excluded in the study due to changing policies in the aquatic sports field in the past ten years. The online survey sheet is attached in Appendix 1.0.

Ethical Considerations

This study observed the fundamental ethical considerations including transparent reporting of facts and proper referencing for all paraphrased information. Similarly, the respondent's knowledge was kept confidential as per the privacy policy in the online surveys. The participation was based on a voluntary basis (Resnik, 2015 December). Every volunteer was notified that the feedback was to be used in a research study aimed at examining player's perception regarding injuries, causes and prevention measures in water polo sporting activities. None of the participants received payment or other financial rewards as a recognition for their participation. This action prevented chances of bias in the data collection process (Sales & Folkman, 2000). This research does not use respondent's information for commercial purposes (Gregory, 2003). All the data given was used exclusively for this study.

Analysis of Data

The researcher used a standard simple coding method in data analysis. This coding technique facilitated the conversion of the questionnaire responses into numerical values that can be manipulated in statistical calculations. A scientific SPSS software version 19.0 is used in the analysis of the data. The SPSS output was then used to project graphs and other visual representations of the findings

Results and discussion

The number of total participants who competed the online survey was 487 (n=487). 41.48% of the participants were female and 58.52% were men. The table I represent gender distribution in the number of participants involved in the study.

Table I. Gender Distribution of Participants

Gender Distribution among participants		%
Females	202	41.48%
Males	285	58.52%
Total	487	100%

This distribution was fairly distributed given that the male players form the highest number of participants in water polo sports, as described in Table II.

Table II: Age distribution in the sample

Age distribution of participants	
Male	frequency
18-20	138
21-30	57
31-40	60
41-45	30
Total	285
mean	23.758 years
Standard deviation	±7.754
Females	Frequency

18-20	150
21-30	30
31-40	22
41-45	0
Total	202
Standard deviation	±4.045 years
Mean	19.861 years

The modal age group of participants in men was 18-20 years, with a representation of 138 participants out of the total 285. The mean for this group was 23.758 years with a standard deviation of ±7.754 years. The same age group was the most populated among female participants with 150 individuals out of the total. The mean age for the female category was 19.861 years and a standard deviation of ±4.045 years. The highest oldest participant was 45 years in men and 38 in women.

Table III. Distribution of Participants in Respective Levels

Distribution of participants in respective levels		No. of Respondents
International Champions	7.18%	35
International league	11.50%	56
Junior Competitions	80.28%	391
National leagues	53.18%	259
Local competition	97.74%	476

The findings of the study showed that 476 respondents (97.74%) had at least participated in a local competition. The lowest percentage of participants (7.18%) reported to have participate in an international championship water polo match. See Table III.

These results support previous studies which state that lack of experience is a significant risk factor for injuries in water polo games. A beginner does not know how to prevent injuries or how it might occur and when. Therefore, this individual is more likely to get injured or injure an opponent during training or actual match. Franić, Ivković & Rudić (2007) note this problem of inexperience is a frequent issue for beginners in water polo sports.

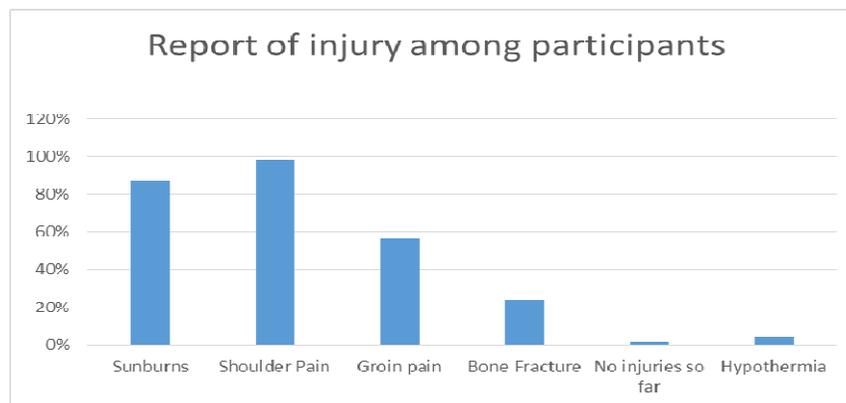


Figure I. Graphical representation of injury report among participants

424 participants (87%) said that they had a sunburn in their water polo sporting history. 479 participants (98.4%) said that they have had a shoulder pain at one point in the past month. 273 participants (56%) reported to have had groin pain in the past month. A relatively lower percentage (23.7%) of the participants said that they have had a bone fracture (dental fractures included). A small percentage of respondents (4.18%) said that they had suffered from hypothermia at one point in their sporting activity. Only 10 (2%) of the respondents said that they have not yet had an injury in their water polo participation history. Described in Figure I.

This information answers the research question on the most frequent injuries in water polo sporting activities. Therefore, safety management teams at water polo sport venues should formulate protective measures against shoulder and groin pain, which are the most frequent forms of injury in water polo training and match sessions. The findings of this study are consistent with the research of other scholars. For instance, researchers such as Pyne, David and Evert (2014) identify that the most frequent types of injuries include shoulder, eye, ear, hip and knee, dental, sunburns, hypothermia and facial lesions.

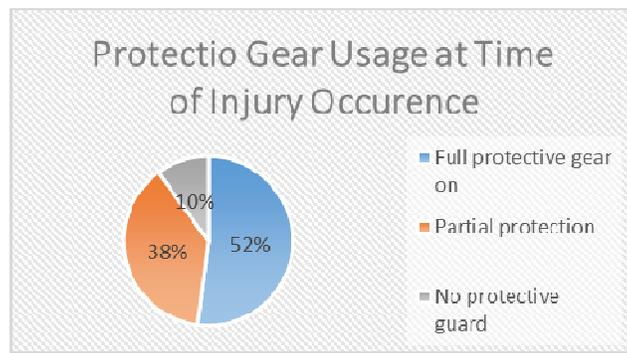


Figure II. Pie Chart Representing Distribution of Preventative Measures Observed at Time of Injury Occurrence.

In response to the protective measure observed during the occurrence of the injury, 253 (52%) respondents said they had protective gears on, 38 % (185 persons) said they had partial protective equipment on and only 49 (10%) said they had no guard gear.

This information implies that protective gear is an effective measure in reducing injuries. The findings of this study are consistent with previous studies. For instance, the article on *Protective head gear* states that many injuries occur to individuals who do not wear the protective equipment or those who don't wear the proper gears during the play. Other studies supporting these results state that a suitable protective uniform should have a mouth guard, ear protector and a cap (Schrack, 1988). A mouth guard protects the players from dental-related injuries (Hersberger, Krastl, Kuhl & Filippi, 2012). On the other hand, ear guard prevents ear-related injuries, and the cap protects the head from external injuries during the game (Margo et al., 2010). However, the findings of this study show that these guards are inadequate because injuries occur even when the player is wearing the guards. Therefore, policy makers should embark on research on the best protective materials for use in the field during water polo matches. Similarly, 10% of the respondents said they had no gears on, therefore, coaches and custodians should enforce the rules so that no player will be allowed to train or participate in a match without full protection guards.

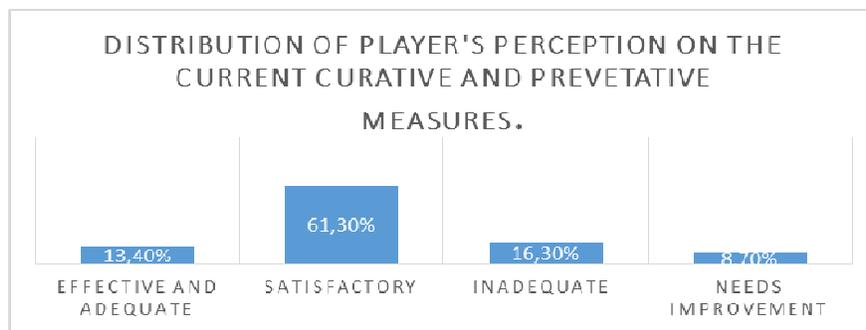


Figure III. Perception regarding the current curative and curative programs

In response to how the players perceived the current preventative and curative programs, the respondents gave the following responses:

The findings of the study showed that 65 (13.4%) respondents said that the current curative and preventative measures were effective and adequate, 61.3% (299 persons) said they are satisfactory, 16.3% and another 8.7% said they are inadequate and needs improvement respectively.

In response to the question on proposed improvements, 380 respondents (78%) agreed that the quality of protective gears needed improvement. The remaining percentage felt that a patient centered care was necessary in the case of serious area-specific injuries, such as skull fracture, dental fractures and hypothermia. Among the participants who had had hypothermia in the past, 83% said that the pools need improvement so that water temperature can be adjusted to the recommendable water polo pool temperatures. Specialists need to recommend the safe pool temperatures for water polo sports.

Conclusions

In summary, injuries are a common phenomenon among water polo players. As a result, many researchers have conducted intensive studies on the best preventative and treatment measures in managing

injuries among these players. However, there lack quantitative studies showing the player's perception regarding the current state of preventative and curative programs in managing injuries in water polo sports.

Therefore, this study aimed at examining the risk factors, common forms of damages, widely used preventative measures and player's perception regarding these aspects of water polo sporting activities. The findings of the study reveal that the most frequent forms of injury include shoulder and groin pain, sunburns, bone fractures and hypothermia. The most significant population of participants (98.4%) said that they have had shoulder pain in the last month and at least at one point in their playing or training life. Another significant proportion of respondents (52%) said that the injuries occurred even if the player had worn the full set of the protective gears. For this reason, 61.3% of the participants felt that the current preventative and curative programs are just 'satisfactory.' An equally significant number of respondents said that these measures are inadequate and needed improvements.

These improvements included the use of better materials in the manufacturing of protective gadgets and recommended patient-centered care for severe injuries to the head and hypothermia. Other than the patient-centered care, policymakers should support the best entry pool temperatures for a safe playing environment for all the players.

Therefore, this research study recommends that the Ministry of Sports and private stakeholders should engage in research activities and identify possible advancements in water polo protective gears to ensure reduced injuries and minimal side effects to the players. Organized championship and leagues should provide a that a standby medical team of professionals is in place before the start of significant matches. This team will respond to cases of a severe skull and bone fracture and hypothermia.

Or logical consequent. Your conclusion is your chance to have the last word on the subject. The conclusion allows you to have the final say on the issues you have raised in your paper, to summarize your thoughts, to demonstrate the importance of your ideas, and to propel your reader to a new view of the subject. It is also your opportunity to make a good final impression and to end on a positive note.

Conflicts of interest: the authors have no conflicts of interest to declare.

References

- Brooks, J. M. (1999). Injuries in water polo. *Clinics in sports medicine*, 18(2), 313-319.
- Chalmers, D. J., & Morrison, L. (2003). Epidemiology of non-submersion injuries in aquatic sporting and recreational activities. *Sports Medicine*, 33(10), 745-770.
- Colville, J. M., & Markman, B. S. (1999). Competitive water polo: upper extremity injuries. *Clinics in sports medicine*, 18(2), 305-312.
- Donev, Y., & Aleksandrović, M. (2008). History of Rule Changes in Water Polo. *Sport Science*, 1(2).
- Feltner, M. E., & Taylor, G. (1997). Three-dimensional kinetics of the shoulder, elbow, and wrist during a penalty throw in water polo. *Journal of Applied Biomechanics*, 13(3), 347-372.
- Franić, M., Ivković, A., & Rudić, R. (2007). Injuries in water polo. *Croatian medical journal*, 48(3.), 281-288.
- Gregory, I. (2003). *Ethics in research*. A&C Black.
- Hersberger, S., Krastl, G., Kühl, S., & Filippi, A. (2012). Dental injuries in water polo, a survey of players in Switzerland. *Dental Traumatology*, 28(4), 287-290.
- Hind, H. W. (1969). U.S. Patent No. 3,454,962. Washington, DC: U.S. Patent and Trademark Office.
- Karantanas, A. H. (2010). Common injuries in water sports. In *Sports Injuries in Children and Adolescents* (pp. 289-317). Springer, Berlin, Heidelberg.
- Lozovina, V., Pavičić, L., & Lozovina, M. (2004). Analysis of indicators of load during the game in the activity of the center in waterpolo. *NAŠE MORE: znanstveno-stručni časopis za more i pomorstvo*, 51(3-4), 135-141.
- Macaluso, F., Di Felice, V., Boscaino, G., Bonsignore, G., Stampone, T., Farina, F., & Morici, G. (2011). Effects of three different water temperatures on dehydration in competitive swimmers. *Science & Sports*, 26(5), 265-271.
- Margo, M., Astrid, J., Manuel, A. J., Lars, E., Ioan, D., David, G., ... & Jiri, D. (2010). Sports injuries and illnesses in the 2009 FINA World Aquatics Championships. *British journal of sports medicine*, bjsports71720.
- McMaster, W. C., Long, S. C., & Caiozzo, V. J. (1991). Isokinetic torque imbalances in the rotator cuff of the elite water polo player. *The American journal of sports medicine*, 19(1), 72-75.
- Mosler, A. B., Blanch, P. D., & Hiskins, B. C. (2006). The effect of manual therapy on hip joint range of motion, pain and eggbeater kick performance in water polo players. *Physical Therapy in Sport*, 7(3), 128-136.
- Mountjoy, M., Junge, A., Alonso, J. M., Engebretsen, L., Dragan, I., Gerrard, D., ... & Dvorak, J. (2010). Sports injuries and illnesses in the 2009 FINA World Championships (Aquatics). *British journal of sports medicine*, 44(7), 522-527.
- Mujika, I., McFadden, G., Hubbard, M., Royal, K., & Hahn, A. (2006). The water-polo intermittent shuttle test: a match-fitness test for water-polo players. *International Journal of Sports Physiology and Performance*, 1(1), 27-39.

- Norusis, M. (2008). SPSS 16.0 advanced statistical procedures companion. Prentice Hall Press.
- O'Brien, M. (1993). Risks and injuries in water sports. In *The Soft Tissues* (pp. 415-422).
- Perunski, S., Lang, B., Pohl, Y., & Filippi, A. (2005). Level of information concerning dental injuries and their prevention in Swiss basketball—a survey among players and coaches. *Dental traumatology*, 21(4), 195-200.
- Platanou, T., & Geladas, N. (2006). The influence of game duration and playing position on intensity of exercise during match-play in elite water polo players. *Journal of Sports Sciences*, 24(11), 1173-1181.
- Pyne, D. B., Verhagen, E. A., & Mountjoy, M. (2014). Nutrition, illness, and injury in aquatic sports. *International journal of sport nutrition and exercise metabolism*, 24(4), 460-469.
- Rechichi, C., Dawson, B., & Lawrence, S. R. (2000). A multistage shuttle swim test to assess aerobic fitness in competitive water polo players. *Journal of science and medicine in sport*, 3(1), 55-64.
- Resnik, D. B. (2015, December). What is ethics in research & why is it important. In *ideas*.
- Rinehart, R. E. (1996). " Fists flew and blood flowed": Symbolic Resistance and International Response in Hungarian Water Polo at the Melbourne Olympics, 1956. *Journal of Sport History*, 23(2), 120-139.
- Rosa, B. B., Asperti, A. M., Helito, C. P., Demange, M. K., Fernandes, T. L., & Hernandez, A. J. (2014). Epidemiology of sports injuries on collegiate athletes at a single center. *Acta ortopedica brasileira*, 22(6), 321-324.
- Sales, B. D., & Folkman, S. E. (2000). Ethics in research with human participants. *American Psychological Association*.
- Schrack, M. E. (1988). U.S. Patent No. 4,768,231. Washington, DC: U.S. Patent and Trademark Office.
- Stromberg, J. D. (2017). Care of Water Polo Players. *Current sports medicine reports*, 16(5), 363-369.
- Witwer, A., & Sauers, E. (2006). Clinical measures of shoulder mobility in college water-polo players. *Journal of Sport Rehabilitation*, 15(1), 45-57.
- Whiting, W. C., Puffer, J. C., Finerman, G. A., Gregor, R. J., & Maletis, G. B. (1985). Three-dimensional cinematographic analysis of water polo throwing in elite performers. *The American journal of sports medicine*, 13(2), 95-98.
- Young, C. C. (2002). Extreme sports: injuries and medical coverage. *Current sports medicine reports*, 1(5), 306-311.