Wheelchair rugby athlete demographics and shoulder pain: a pilot study

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INTRODUCTION

Over time, the number of wheelchair users participating in competitive sports has continued to increase [1]. Basketball, tennis, and rugby are among the many sports that have been adapted for individuals who use wheelchairs and have gained popularity. Evidence shows that this increase in competitive sports is healthy for this population, both physically and mentally. While involvement in these activities is recommended to maintain physical health through exercise, participation in adaptive sports has also been shown to have positive effects on self-esteem, self-efficacy, sense of belonging, and overall quality of life in individuals who use wheelchairs [2].

Because involvement in adaptive sports has shown so many benefits, it is important for this population to stay healthy enough to continue participation. Shoulder pain and injury are the most common reasons for decreased participation [1]. Individuals in wheelchairs are required to use their upper extremities and shoulders in all sports-related occupations as well as numerous activities of daily living. With the shoulder being the most common area seen for injury [1], it is highly important to keep it structurally intact and as pain-free as possible. Evidence shows that exercise keeps the shoulder working so it is recommended to participate in exercise regularly [1]; however, if individuals are experiencing too much shoulder pain, we must find a solution or participation is going to decrease as injuries increase.

Wheelchair rugby is among the many adaptive sports gaining popularity around the world. This Paralympic team sport is designed for individuals with disabilities, most commonly quadriplegia and other physical impairments, and has active leagues both throughout the United States and internationally. The purpose of this pilot study is to describe the characteristics of individuals who play wheelchair rugby, utilize the WUSPI to identify the prevalence and severity of shoulder pain, and begin to identify correlations between wheelchair rugby athletes and their WUSPI scores. Reasons for conducting this study include a lack of literature on shoulder pain in wheelchair athletes, specifically those participating in wheelchair rugby. The information found in this study can lead to further research on the same population to learn more about shoulder pain and integrity and possible preventative measures to be used to decrease perceived shoulder pain.

METHODS

Design

This was an associational observational study. The study took place at the Cleo Dumaree Athletic Complex during a tournament in December 2017. The study was approved by The Ohio State University IRB. Informed written consent was obtained by all participants.

Participants

A convenience sample of ten athletes participating on the Columbus Blitz wheelchair rugby team were observed in this study. Participants were all males ages 21-46.

Procedure

Data was collected through a self-reported survey that participants either filled out themselves or was administered verbally by one of the members of the research team, depending on the capabilities and preference of the participant. Information collected included demographic information, Disabilities of the Arm and Shoulder (DASH), and Wheelchair Users Shoulder Pain Index (WUSPI) scores. Demographic information collected and considered potential correlates included age, diagnosis, time since injury, years playing wheelchair sports, and wheelchair rugby classification score. Though the DASH was collected, we are only focusing on the WUSPI for this analysis.

WUSPI

The WUSPI is a self-reported measure that assesses upper extremity pain and function in individuals who use wheelchairs. The scale is used to evaluate wheelchair users' pain while performing daily functional activities.

Scores can range from 15-150, and are determined by patient reported outcomes of a 1-15 rating on pain during 10 functional activities, with 15 being the most painful. This measure is used specifically for manual wheelchair users and frequently with the spinal cord injury population, so we found it the best measure to use in our comparisons throughout this study. [3]

Analysis

Demographic information and scores from the DASH and WUSPI were coded into a table for analysis. We decided to exclude participants diagnosed with Cerebral Palsy (CP) to focus on a homogenous group of participants with Spinal Cord Injuries (SCI). Future studies should assess data from participants diagnosed with CP. We also ignored participant data from those scoring 20 or less on the WUSPI, allowing us to focus on wheelchair rugby participants with apparent shoulder pain. The descriptive statistics were obtained and correlation analysis were performed using Microsoft Excel 2016 (v. 1705).

RESULTS

The average WUSPI score among all participants was 39.75 with a standard deviation of 23.51 and a range of 15 to 73. Table 1 shows further demographic information of participants used for analysis. There showed no correlation between either time since injury and time playing wheelchair rugby sports with WUSPI scores (r^2<0.05 for both). Participants with incomplete SCI expressed having more shoulder pain than the participant with a complete SCI. There is a strong correlation between level of SCI and average WUSPI score (r^2=0.94) [Figure 1]. While our results show no correlation between age of participants and WUSPI scores (r^2<0.05), removing the outlier of the participant whom scored 33 on the WUSPI shows potential for a positive correlation between age and WUSPI score (r^2 = 0.22). Lastly, our results show a moderate positive correlation between wheelchair rugby classification scores and WUSPI scores (r^2=0.67) [Figure 2]. For the purpose of this study, we defined little or no relationship as below 0.25, a fair relationship as between 0.25 and 0.5, a moderate to good relationship between 0.5 and 0.75, and an excellent relationship as above 0.75 [4].

Participant	Age	Diagnosis	Complete/Incomplete	Years Since Injury	Years Playing Wheelchair Sports	Classification Score	WUSPI
101	42	SCI	Incomplete	25	24	1.5	73
103	41	SCI	Complete	23	23	0.5	33
105	46	SCI	Incomplete	16	10	2.0	63
107	38	SCI	Incomplete	16	12	0.5	44
109	34	SCI	Incomplete	9	7	1.0	59

Table 1. Demographic information of participants with SCI expressing shoulder pain

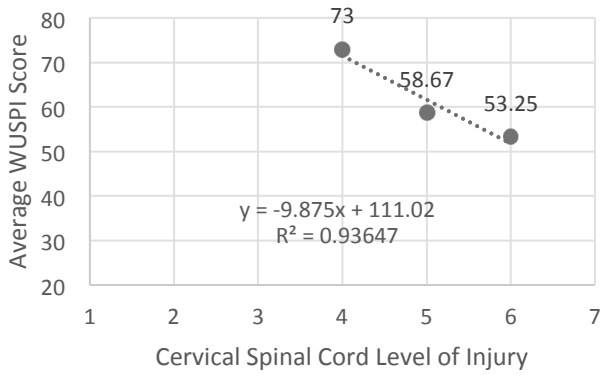

Figure 1. Association of level of SCI and average participant WUSPI score

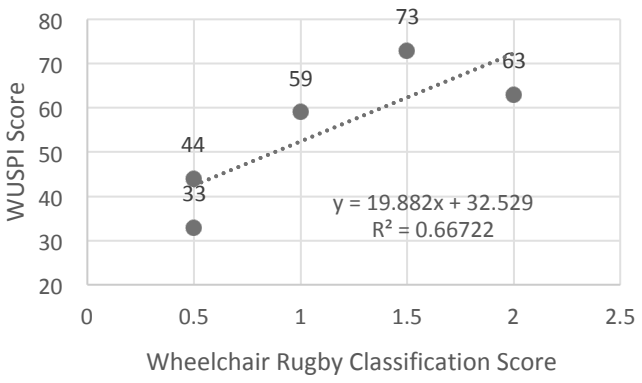

Figure 2. Association of participant wheelchair rugby classification score and WUSPI score

DISCUSSION

While evidence shows that wheelchair athletes are experiencing shoulder pain, explaining this occurrence has been much more difficult. Many studies have looked at correlations between athlete demographics and shoulder pain, but there are still discrepancies regarding the cause of the pain. The average WUSPI score of all participants in our study, 39.75 (N=10), was high in comparison to studies of manual wheelchair users, averaging 23.08 [5] but low in comparison to other wheelchair athletes. Byung-chun et. al. reported an average WUSPI score of 44.42 for adapted table-tennis athletes and 54.69 for adapted archery athletes [6]. This study gives further evidence that wheelchair athletes report having more shoulder pain than those who do not participate in competitive sports. Mixed results have been reported as to the correlation between both time since injury and time playing wheelchair sports and WUSPI scores, including seeing either a positive correlation or no correlation between the two [5-7]. Only one other article has compared severity of injury (e.g. complete vs incomplete spinal cord injury) to WUSPI scores of wheelchair users and found no correlation [5]. Other literature has also found a positive correlation between SCI level and reported shoulder pain [7]. Researchers have found no correlation between age and reported shoulder pain, as well [5-7]. No other articles have looked at the correlation between wheelchair rugby classification scores and reported WUSPI scores. Other demographic information that has been studied in correlation to WUSPI scores includes weight, gender, body mass index, and training status [5-6], and are variables to consider when performing future studies of this population.

Our results confirm the findings of other research studies which identified shoulder pain reported by wheelchair athletes. We hypothesize three reasons for the positive correlation between WUSPI score and the wheelchair rugby classification score. First, we assume that rugby players with higher classification scores complete more strokes per game. This increase in stroke frequency could be damaging to the integrity of the shoulder and should be further studied. Second, we suspect that players with higher classification scores are participating in games more actively, including passing, dribbling, and reaching over head. Conversely, players with lower classification scores may be spending more time making shorter passes and maintaining neutral anatomic position of the arm and shoulder. Rhodes et. al. breaks down the differences between wheelchair rugby players with high, medium, and low classification scores and profiles how involved in the game players are in each category on average [8]. This increase in movement in the shoulder may be contributing to players with a higher classification score experiencing more pain in the shoulder. Last, we predict that players with higher classification scores are participating in more independent transfers in a day than players with lower classification scores. We also believe that players with lower classification scores may be more willing to ask for help when performing activities of daily living, specifically transfers, in comparison to players with higher classification scores who may be determined to perform transfers independently. Specifically, pre-and post-game transfers could cause damage to higher class players especially if players are already fatigued. Further analysis should be done on these correlations to better understand shoulder pain in players with higher classification scores.

Future studies on level of SCI and shoulder pain may also lead to a better understanding of the reason behind the correlation. A better understanding of the relationship between level of SCI and perceived pain may contribute to more specific treatments and compensatory activities specific to those with injuries at each level, such as individualized exercise programs and strength training routines.

Limitations can be found in this study, including using a convenient and small sample size and data being collected by 3 research assistants (response bias). However, our results act as a pilot study for further investigation into reported shoulder pain by wheelchair athletes, specifically wheelchair rugby participants.

Further analysis should be done with a larger sample of more diverse wheelchair rugby athletes to determine more accurate correlations between wheelchair rugby participants and perceived shoulder pain. Future studies should also search for preventative measures to any associations found in comparative studies. Future studies should be more generalizable to wheelchair athletes participating in other wheelchair sports.

CONCLUSIONS

There is a lack of literature explaining why certain wheelchair athletes experience more severe shoulder pain than others. Our findings identify a potential correlation between level of SCI and level of pain. Specific to wheelchair rugby athletes, these results also show potential correlations between classification score and level of pain. Clinical implications should include clinicians being more aware of the impact of shoulder pain of wheelchair users in their daily lives, understanding the relationship between level of SCI and the rate of pain they may have, and to keep this information in mind when creating treatment plans, home exercise programs, or other forms of treatment during therapy.

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