HOW CONCUSSION FREQUENCY IS GREATER IN COLLEGIATE ATHLETES THAN ADOLESCENT ATHLETES

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ABSTRACT: Multiple studies have examined concussion frequency in athletes of all levels of play. Younger athletes are not immune to suffering this head injury that can have detrimental effects on how the brain functions. Numerous athletes in the age group of 13-23 year olds suffer extreme situations such as paralysis or even death after sustaining a concussion while playing a sport (Golomb, Grayson, Kralik, McLendon, 2016). Some studies have demonstrated that the prevalence of concussions is greater in youth athletes, whereas other studies seem to indicate that concussions are more persistent in collegiate and professional athletes. The aim of this study was to analyze previously published data on athletes ranging from the high school to the collegiate level and determine if concussion occurrence was greater in collegiate athletes than in adolescent athletes, or any athlete between 13-18 years of age. Based on my analysis, the concussion abundance in the tested adolescent athletes was 3.7% and the occurrence in the collegiate athletes was over twice as much at about 7.5%. This data demonstrates that concussion frequency in collegiate athletes is indeed greater than the adolescent athletes' frequency. Information such as this can open possibilities to having more intense research on concussion frequency in collegiate athletes as well as improving the concussion protocol that is already in place.

KEYWORDS: Concussion, frequency, adolescent, collegiate

Introduction

Concussions, which are blows to the head that cause brain-altering injuries, have become an increasingly topical issue in today's society. Although concussions can occur to anybody, the profile of this serious brain injury has risen primarily in the world of sports and an absolute solution has not been discovered. In this literature review, the difference in concussion frequencies between differently aged athletes was examined. It is critical to further develop an understanding of concussions because the issue is becoming more of a presence in adolescent and collegiate athletes. In fact, a 60% increase in concussion occurrence was noted from the years 2007 to 2014 in athletes ranging from 10 to 19 years of age. (Feeley, Rugg, Senter, Sing, Zhang, 2016).

Multiple studies that examine concussion frequencies in high school and college athletes have been done. According to one study in which over 8,000 athletes from high school and collegiate levels participated, nearly 400 of the athletes received a concussion while playing a sport (Marshall et al. 2015). However, this particular study did not compare and contrast any potential differences in concussion frequencies between the adolescent and collegiate players that were examined and studied. To address this issue, the data collected from my research will focus on four different studies from within the last two years to examine differences in concussion frequencies between adolescent and collegiate athletes.

Methods

To determine how concussion frequencies vary amongst adolescent and college athletes,

I searched key word combinations such as "concussion AND adolescent" and "concussion AND collegiate" on a database called PubMed. These specific key word combinations were used in the hopes that the database would provide the most pertinent information regarding concussion occurrence in both adolescent athletes and collegiate athletes. After receiving excessive results, filters were applied to only feature any work or projects that were done within the last decade. Doing this provided the most up-to-date information about concussions in sports while keeping the focus primarily on college and adolescent athletes. The results that were assessed and kept had ideal sample sizes of athletes, as well as a range of both female and male athletes in various sports. The minimum requirement in terms of sample size was 1,000 athletes. Also, research that included tables, graphs, or any other sort of figures in the writing was favored because those tools already had the information presented in numerical and clear ways.

Results

The results for concussion frequency came out to be 3.7% for the adolescent athletes and 7.5% for the collegiate athletes (See Table 1 and Graph 1). Although the difference in concussion frequency between the two groups was noticeable, it is important to note the differences in the sample sizes of both concussions and number of athletes. The adolescent group featured more athletes in the studies but fewer concussions were reported. Conversely, the collegiate group had a smaller sample size of athletes to work with, but a greater frequency of concussions was present. Ultimately, this data demonstrated that concussions are more common in collegiate athletes than adolescent athletes.

Discussion

Analyzing the Data

Data was extracted from the four studies featured in Table 1 and Figure 1. Dompier et al. (2015) and Reeser et al.(2015) both directly compared adolescent concussion occurrence to collegiate concussion occurrence, while Currie et al. (2016) and Zuckerman et al. (2015) each focused their attention on adolescent and collegiate athletes respectively. For the purposes of this particular analysis of the data, athletes were only separated based on whether they were an adolescent or collegiate athlete, not based on their sport or gender. Also, no more than one concussion was counted for one athlete, meaning that multiple concussions per the same athlete would not count as different occurrences. For each of the four studies, the number of adolescent athletes and adolescent concussions were calculated and the same was done for the collegiate athletes. After this, the totals for number of concussions and athletes for both the adolescent and collegiate categories were combined, the percentage for each group was calculated, and the two values were compared with each other to see which one was greater.

Table 1. Calculated percentages of each source's statistics for adolescent and college concussion-to-number-of-athlete ratio and calculated percentages of each age group's total number of concussions and athletes based on the information the sources provided.

Source	# of Concussions (Adolescent)	# of Athletes (Adolescent)	Frequency % (Adolescent)	# of Concussions (Collegiate)	# of Athletes (Collegiate)	Frequency % (Collegiate)
Dompier et al. (2015)	412	16,049	2.6%	111	4,305	2.6%
Reeser et al. (2015)	23	1,574	1.5%	25	2,490	1.0%
Currie et al. (2016)	245	777	31.5%	No Data	No Data	No Data
Zuckerman et al. (2015)	No Data	No Data	No Data	888	6,932	12.8%
Total for athlete # and concussion #	680	18,400	3.7%	1024	13,727	7.5%

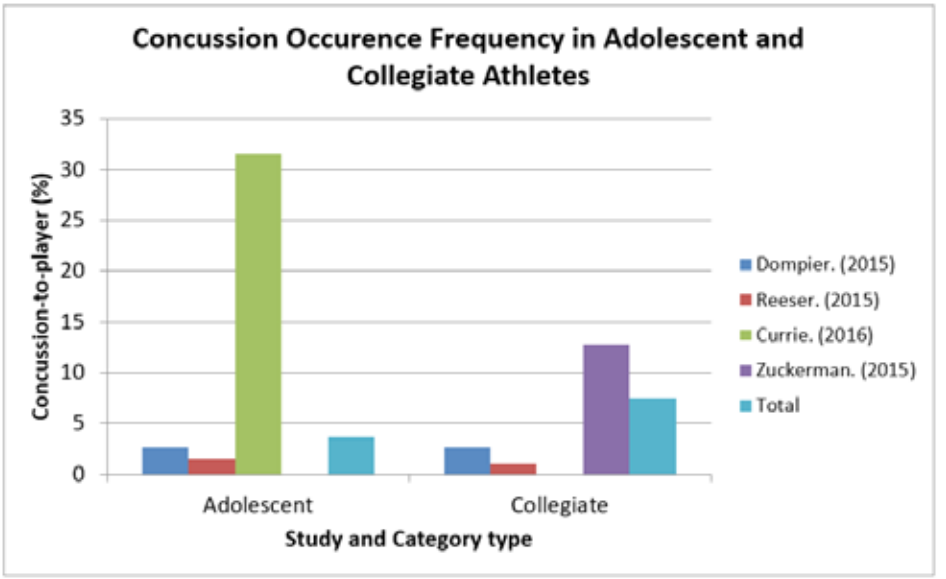

Figure 1. Calculated percentages of each source's statistics for adolescent and collegiate concussion-to-number-of-athlete ratio and calculated percentages of each age group's total number of concussions and athletes.

Limitations of the Study

In terms of the analysis done in this study of the concussion frequency differences in the adolescent and collegiate athletes, there were some limitations. For instance, there were 5,000 more adolescent athletes than collegiate athletes featured. The results of this study may have been more indicative of the differences in concussion frequency between the two age groups if the sample sizes were more similar to each other. Another example of a limitation is the fact that age was the only distinguishing factor between the athletes; gender and sport was disregarded in my analysis.

The Research Field's Future Direction

In such a relatively new research field such as this particular one on concussions, the emphasis has been placed on the understanding of concussions and potential prevention methods. Helmets are viewed as equipment that can help in concussion prevention, particularly for younger athletes who play contact sports such as football and hockey. For instance, one study tested 35 different helmet models and gave them ratings based on their performance over multiple impact tests (Allen, 2016). Some particular helmets performed sufficiently for most of the time, while others were adequate sometimes. The issue here is that these results do not definitively demonstrate that any particular helmet will always protect the athlete completely and constantly.

When studying concussions in younger athletes in the future, researchers should look very closely at whether or not athletes of a certain sport are more prone to concussions, or if gender has any correlation with concussion frequency. Future studies should have identical or near-identical sample sizes when comparing two different groups to each other. Additionally, the literature review conducted in this paper only focused on the difference in whether the athletes were adolescent or collegiate. Seeing these two groups be further broken down based on the sport type or gender of the athletes could tell a lot about which factor is a bigger contributor to concussion frequency over another factor. Having a better understanding of the differences in concussion frequency between different groups of athletes may identify the pathway to solving this concussion epidemic in the future.

Acknowledgements

I would like to take this opportunity to thank Dr. Heather Galindo for her continued support and advice in helping me compose this paper effectively, as well as being a fantastic source of knowledge in the Scientific Writing course at UWB during the Autumn Quarter of 2016. Also, I would like to thank one of the phenomenal librarians here at UWB, Alyssa Berger, for providing guidance and helping me understand how to utilize the resources available on this campus that helped me immensely for this literature review. Additionally, I would like to thank the folks in the Writing and Communication Center here at UWB that tutored me on how to write and communicate my thinking more effectively. Finally, I would like to thank my fellow Scientific Writing students who took the time to review my work and gave me very constructive feedback on how to improve my work.

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