Headache-Related Disability Reported by Collegiate Athletes

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ABSTRACT

Limited data exist regarding the effects of headache on athletes' quality of life. The purpose of this study was to examine the effects of headache on athletes' health-related quality of life. A secondary purpose was to examine the association of these effects with self-reported demographic data related to concussion history. A survey instrument, including demographic information, concussion history, and the Migraine Disability Assessment Score (MIDAS), was completed by 251 collegiate athletes (mean age, 19.23±1.81 years). Descriptive statistics were obtained for the MIDAS and demographic information. Less than 10% of athletes reported that headache interfered with athletic participation in the past 3 months. A chi-square test of association suggested that individuals who self-reported at least 1 previous concussion were more likely to report higher headache disability than individuals with no previous concussions (χ^2 [(1)] = 6.63; P = .010). Headache characteristics and quality of life issues should continue to be evaluated using outcome-based measures.

Headache is a common condition among all populations and can affect daily living. It is estimated that the overall global prevalence of headache is as high as 47% and the global prevalence of migraine is 10% to 13%.[1,2] The burden of headache can result in missed work, decreased social activity, and difficulty performing daily activities that affect quality of life. Among athletes, headache may result in loss of participation time or effects on athletic performance. Although there are estimates of the epidemiology and burden of headache in the global and general populations, few studies have examined the effects of headache regarding quality of life in the athletic population.

As a result of the intensity of activity and occurrence of head trauma, athletes may be prone to experiencing headaches. However, little epidemiological information on headache in athletes exists. Williams and Nukada[3] found that 60% of headaches in a sample of athletes were effort-exertion headache, 22% were post-traumatic headache, 15% were sports migraine, 9% were effort migraine, and 6% were trauma-triggered migraine. Much of the descriptive headache literature examining headache in athletes has focused on Australian football, American football, and soccer. These studies suggest that approximately 80% of athletes experience headache during athletic play[4] and that some athletes may have a higher prevalence of migraine headache compared with the normal population.[5] Reported cases of migraine due to hitting or heading in soccer have also been reported in the literature[6]; however, little empirical data exist on this phenomenon.

In sports medicine, most literature has focused on headache immediately following concussive injury. Headache is the most common symptom following concussion and occurs in up to 86% of individuals with concussion.[7,8] Headache that results from concussions can range from mild to severe[9,10] and may be present in various forms and durations following injury. Individuals

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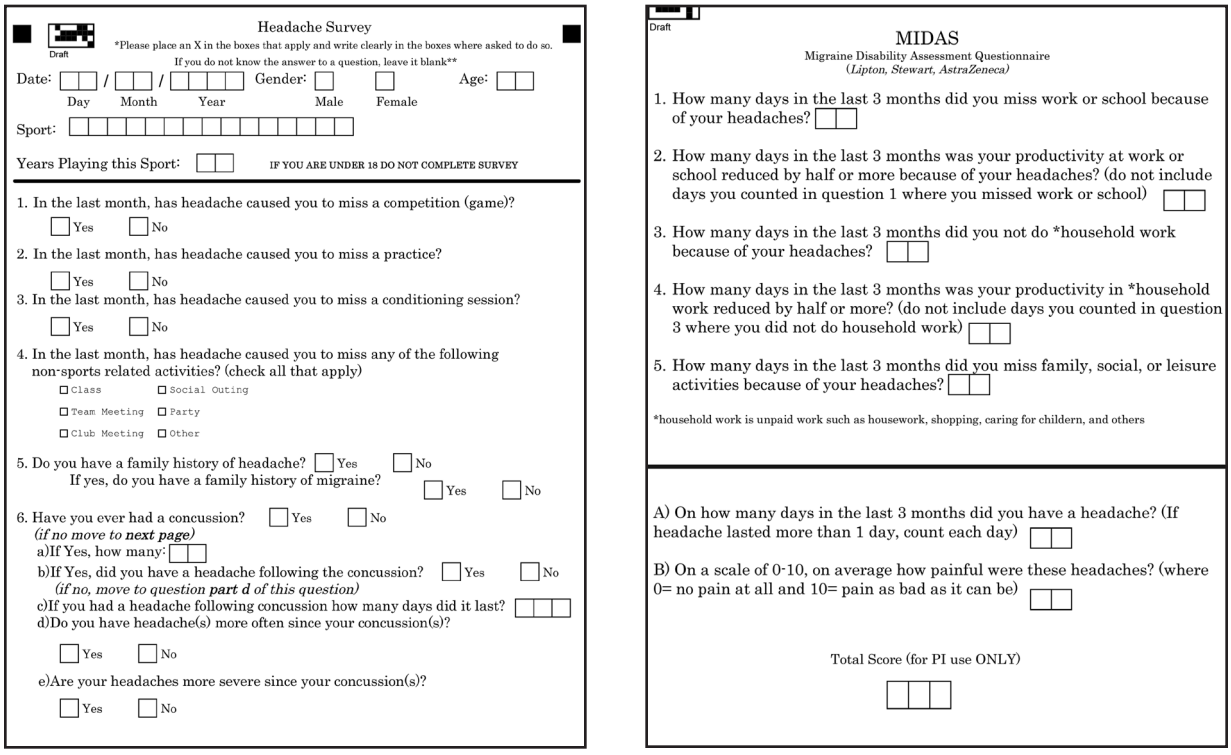
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Headache Survey

*Please place an X in the boxes that apply and write clearly in the boxes where asked to do so.
If you do not know the answer to a question, leave it blank**

Date: ☐☐ / ☐☐ / ☐☐☐☐ Gender: ☐ ☐ Age: ☐☐
Day Month Year Male Female

Sport: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Years Playing this Sport: ☐☐ IF YOU ARE UNDER 18 DO NOT COMPLETE SURVEY

1. In the last month, has headache caused you to miss a competition (game)?
☐ Yes ☐ No
2. In the last month, has headache caused you to miss a practice?
☐ Yes ☐ No
3. In the last month, has headache caused you to miss a conditioning session?
☐ Yes ☐ No
4. In the last month, has headache caused you to miss any of the following non-sports related activities? (check all that apply)
☐ Class ☐ Social Outing
☐ Team Meeting ☐ Party
☐ Club Meeting ☐ Other
5. Do you have a family history of headache? ☐ Yes ☐ No
If yes, do you have a family history of migraine? ☐ Yes ☐ No
6. Have you ever had a concussion? ☐ Yes ☐ No
(if no move to next page)
a)If Yes, how many: ☐☐
b)If Yes, did you have a headache following the concussion? ☐ Yes ☐ No
(if no, move to question part d of this question)
c)If you had a headache following concussion how many days did it last? ☐☐☐
d)Do you have headache(s) more often since your concussion(s)?
☐ Yes ☐ No
e)Are your headaches more severe since your concussion(s)?
☐ Yes ☐ No

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MIDAS
Migraine Disability Assessment Questionnaire
(Lipton, Stewart, AstraZeneca)

1. How many days in the last 3 months did you miss work or school because of your headaches? ☐☐
2. How many days in the last 3 months was your productivity at work or school reduced by half or more because of your headaches? (do not include days you counted in question 1 where you missed work or school) ☐☐
3. How many days in the last 3 months did you not do *household work because of your headaches? ☐☐
4. How many days in the last 3 months was your productivity in *household work reduced by half or more? (do not include days you counted in question 3 where you did not do household work) ☐☐
5. How many days in the last 3 months did you miss family, social, or leisure activities because of your headaches? ☐☐

*household work is unpaid work such as housework, shopping, caring for children, and others

A) On how many days in the last 3 months did you have a headache? (If headache lasted more than 1 day, count each day) ☐☐

B) On a scale of 0-10, on average how painful were these headaches? (where 0= no pain at all and 10= pain as bad as it can be) ☐☐

Total Score (for PI use ONLY)
☐☐☐

Figure. A cross-sectional questionnaire including the Migraine Disability Assessment Score (MIDAS) was used in the study.

reporting headache immediately following injury have been shown to have greater neurocognitive deficits that are magnified by severity of the posttraumatic headache and presence of migraine-like symptoms.[9-11] Despite evidence of the acute effects of posttraumatic headache, little information exists on long-term effects and characteristics of headache potentially associated with brain trauma in athletes.

The World Health Organization defined *health-related quality of life* (HRQOL) as "an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, standards, expectations, and concerns."[12] HRQOL is often measured using general outcome instruments that examine overall perceived health status and specific instruments related to conditions that can affect HRQOL, such as MIDAS. There is little descriptive information using outcome measures on the overall effect of headache on various aspects of HRQOL in the general athletic population. The purpose of this study was to examine the effects of headache on the athletic population's quality of life. A secondary purpose was to examine the association of these effects with self-report demographic data related to concussion history to gain a better understanding of how previous concussion history may influence these effects.

METHOD

Institutional review board approval was obtained prior to initiation of the study. A cross-sectional questionnaire (Figure), including the MIDAS, was used in the study. The MIDAS has been shown to be a valid, reliable, and internally consistent tool for assessing headache-related disability as measured against physician judgment.[13,14] Concussion history was determined by the athlete's yes-or-no response to the question "Have you ever experienced a concussion?" A sample of 251 collegiate athletes served as subjects for this study (71 women, 180 men; mean age, 19.23±1.81 years). All athletes on the roster who participated in men's and women's fencing, men's golf, men's and women's lacrosse, baseball, women's volleyball, wrestling, women's field hockey, men's and women's soccer, and cheerleading teams at a local Division I university were selected to participate during the 2006-2007 school year. Table 1 includes the frequency and percentage of athletes by sport. Three

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hundred questionnaires were originally distributed, and 251 were returned for analysis (84%).

An institutional review board-approved fact sheet explaining the study was given to all subjects. Completion and return of the questionnaire served as informed consent. All athletes completed a questionnaire containing demographic information, self-reported lifetime concussion history, and MIDAS prior to or following an athletic practice. The questionnaire was anonymous and all athletes placed the questionnaire in a sealed envelope to be returned to the principal investigator. Subjects were asked to return the questionnaire in a sealed envelope whether they completed the questionnaire or not in order to protect anonymity. The certified athletic trainer for each athletic team distributed and collected the questionnaire packets and returned them to the principal investigator.

TABLE 1

Percentage of Athletes From Each Sport (N = 251)

	FREQUENCY	
SPORT	**MALE (%)**	**FEMALE (%)**
Lacrosse	44 (17.5)	9 (3.6)
Baseball	38 (15.1)	NA
Soccer	29 (11.6)	32 (12.7)
Wrestling	29 (11.6)	NA
Fencing	19 (7.5)	10 (4)
Volleyball	NA	14 (5.6)
Golf	10 (4)	NA
Cheerleading	NA	9 (3.6)
Field hockey	NA	8 (3.2)
Total	169 (67.3)	82 (32.7)

Abbreviation: NA, Not Applicable

STATISTICAL ANALYSIS

All statistical analyses were conducted using SPSS version 16.0 software (SPSS Inc, Chicago, Ill) for Macintosh. Alpha level was set to 0.05 a priori. Both the total score and individual questions from the MIDAS were evaluated. Descriptive demographic data related to effect of headache included concussion history and days lost (athletic participation). A chi-square test of association with 1 degree of freedom was used to examine the association between MIDAS score and previous history of concussion. Individuals with MIDAS scores ranging from 0 to 10 (minimal to mild disability) were placed in the lower disability group, and those with MIDAS scores of >10 were placed in the higher disability group for this analysis. A table of MIDAS grade definition scores is included in Table 2.

RESULTS

MIDAS Data

Eight percent (n=21) of the sample reported a MIDAS score in the moderate-severe disability range. Only 19 of these individuals reporting moderate-severe disability completed information about games, practices, and family history of headache on the questionnaire. Of these 19 reporting, 5 athletes reported a family history of headache, 2 reported missing a game and a practice in the past month because of headache, 4 reported missing class in the past month because of headache, and 13 reported missing a social outing in the past month because of headache. Group mean scores and medians for each scored question of the MIDAS are presented in Table 3. Table 4 presents the distribution of MIDAS total scores in the sample.

Demographic Data

Descriptive demographic data obtained on the effects of headache on activity and family history are presented in Table 5. A significant association was observed between previous history of concussion and MIDAS group score, with individuals with a previous history of concussion being more likely to report migraine and headache disability as moderate to severe than individuals with no previous concussions (χ^2 [(1)] = 6.63; P = .010).

DISCUSSION

The main finding of this study is that, among college athletes, headache does not appear to result in significant time lost to practice or competition in. This overall finding may be attributed to the mindset and motivation of athletes and the relatively healthy population of people participating in collegiate athletics. Thirteen of the 19 athletes reported moderate to severe headache disability on the MIDAS and a missed social activity within 1 month of survey completion. This finding is important, as social involvement and perceptions have been shown to influence an individual's perceptions related to quality of life.[15,16] Although a small number reported miss-

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TABLE 2

Migraine Disability Grade Scoring and Scores from the Sample

GRADE	SCORE	DEFINITION	FREQUENCY	
			TOTAL SAMPLE (N = 251)	PREVIOUS CONCUSSION (N = 85)[c]
I[a]	0-5	Minimal or infrequent disability	214 (85.2%)	66 (77.6%)
II[a]	6-10	Mild or infrequent disability	17 (6.8%)	7 (8.2%)
III[b]	11-20	Moderate disability	11 (4.4%)	7 (8.2%)
IV[b]	>21	Severe disability	9 (3.6%)	5 (5.9%)

[a] Group 1 classification for current study.
[b] Group 2 classification for current study.
[c] Total sum equals 99.99% due to rounding.

TABLE 3

Scores for MIDAS Questions[a] by Concussion History Group

QUESTION	NO PREVIOUS CONCUSSION (N = 166)				PREVIOUS CONCUSSION (N = 85)			
	MEDIAN	MIN, MAX	MEAN	SD	MEDIAN	MIN, MAX	MEAN	SD
Missed work or school because of your headaches	0	0, 4	0.12	0.59	0	0, 7	0.20	0.91
Productivity at work or school reduced by half or more because of your headaches (not counting days listed as missed)	0	0, 10	0.36	1.22	0	0, 14	1.12	2.53
Did not do housework because of your headaches	0	0, 10	0.35	1.15	0	0, 14	0.98	2.65
Productivity in household work reduced by half or more because of your headaches (not counting days missed)	0	0, 10	0.42	1.51	0	0, 14	0.94	2.63
Missed family, social, or leisure activities because of your headaches	0	0, 11	0.38	1.40	0	0, 15	1.21	2.87
MIDAS Total Score	0	0, 90	1.61	4.70	0	0, 49	4.49	9.34
How painful were these headaches (scale 1 to 10) over past 3 months)[b]	2	0, 8	2.33	2.45	3	0, 8	2.78	2.36
Did you have a headache (number of days over past 3 months)[b]	1	0, 36	3.89	7.70	2	0, 50	4.49	9.34

Abbrevation: MIDAS, Migraine Disability Assessment Score.
[a] All questions prefaced by How many days in the past 3 months?
[b]Not scored in MIDAS total score.

ing social outings, it appears that even among athletes, the effects of headache may be related to a decrease in normal life activities. The data also suggested an association between self-reported concussion history and headache-related disability.

The overall effect of headache in the athletic population appears to be minor, as the mean total MIDAS score for the sample was 2.59±6.78. The MIDAS gives a score ranging from 0 to >21. A score of 0 to 5 represents minimal disability, 6 to 10 represents mild or infrequent disability, 11 to 20 represents moderate disability, and scores >21 represent severe disability resulting from headache. Many of our findings may be the result of the MIDAS being intended for the average population. Psychological literature has indicated athletes have different motivations and levels of activity than the general population,[17-20] specifically more competitive athletes such as those used in

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this study. The MIDAS also does not assess effects on athletic participation; however, questions about not participating in practice or competition were included in our demographic questionnaire. Only 3 people reported missing a game, and only 7 athletes reported missing practice as a result of headache. Motivation may also play a role in athletes' decisions to participate in athletic activity, which requires a different level of activity than the concepts assessed in the MIDAS, such as household chores and general work. Many of the MIDAS studies evaluated only individuals with classified headache disorders. The degree of impact reported by individuals attending universities in Turkey[21] was significantly higher than those reported in our study, again suggesting that a different set of questions may need to be asked to address the effects of headache in the athletic population. To assess these effects, the tool would need to be more specific to athletic performance, practice, and events.

More than 30% of the study sample reported at least 1 previous concussion. This finding is in the range of current literature, as the prevalence reported in previous studies range from 5% to 50%, including the possibly of unreported concussions.[7,22-24] Ninety-percent of our sample with a concussion history reported having a headache immediately following concussion, although less than 5% reported that their headaches following recovery from concussion were more frequent or severe. This finding is worth noting, as one recent studied suggested an association between history of concussion and presence of headache in healthy athletes, largely driven by individuals with a history of 3 or more previous concussions.[10] Questions surrounding postconcussion syndrome were not addressed in the current study, but it is important to note that long-term headache following concussion has also been shown to be a hallmark of postconcussion syndrome[7,9,10,25,26] and may benefit from the use of patient-report headache scales such as the MIDAS to monitor postconcussion headaches.

There was a significant association between MIDAS group and a previous history of concussion. Results indicated that individuals with a previous history of concussion were more likely to report more impact or disability resulting from headache than were individuals with no history of concussion. This finding is consistent with the literature, which suggests long-term effects of concussion and reinforces the importance only of proper detection and management of recurrent concussion. The association between headache disability and history of concussion adds to the body of literature that suggests long-term effects of concussions such as memory issues and depression.[27-30] Despite these effects, it is important to again note that few athletes reported missing games or practices as a result of headache, but they did report missing household or social activities. We did not assess motivation or psychological components to these decisions but think it is important to mention these because they may help to explain some of our findings.

TABLE 4

Frequency of Migraine Disability Assessment Scores Total Disability Scores

TOTAL SCORE	FREQUENCY (N = 251)
0	179 (71.3%)
1	10 (4%)
2	6 (2.4%)
3	9 (3.6%)
4	7 (2.8%)
5	3 (1.2%)
6	5 (2%)
7	3 (1.2%)
8	5 (2%)
9	2 (0.8%)
10	2 (0.8%)
12	3 (1.2%)
14	1 (0.4%)
15	4 (1.6%)
18	1 (0.4%)
19	1 (0.4%)
20	1 (0.4%)
22	2 (0.8%)
24	2 (0.4%)
26	1 (0.4%)
35	1 (0.4%)
45	1 (0.4%)
46	1 (0.4%)
49	1 (0.4%)

LIMITATIONS

As with any study, ours is not without limitations. We had more men than women in our study, which may have influenced our findings because with many headache disorders, women are more likely to have headache

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TABLE 5

Number of Subjects Reporting Days Missed and Family History of Headache

QUESTION	FREQUENCY, TOTAL SAMPLE (N = 251)[b]	FREQUENCY, PREVIOUS CONCUSSION (N = 85)[b]
During the past month, headache resulted in missed game	3 (1.2%)	2 (2.4%)
During the past month, headache resulted in missed practice	7 (2.8%)	3 (3.5%)
During the past month, headache resulted in missed conditioning	4 (1.6%)	2 (2.4%)
During the past month, headache resulted in missed class	15 (6%)	9 (10.6%)
During the past month, headache resulted in missed team meeting	3 (1.2%)	2 (2.4%)
During the past month, headache resulted in missed social outing	28 (8.7%)	17 (20%)
Family history[a] of headache disorder	39 (15.5%)	15 (17.6%)
Family history[a] of migraine	29 (11.6%)	12 (14.1%)

[a] Family history was defined as parents, grandparents, or siblings.
[b] Frequencies and percentages for each question listed represent those respondents answering yes to each specific question out of the total sample (251) and the total number reporting a previous concussion (85).

than men.[1,2] Perhaps the greatest limitation was that the MIDAS is aimed at the average population and not athletes. We attempted to overcome this limitation by including questions surrounding missed practices and competitions because of headache. American football was not included in this study, as most of the literature has focused on headache in football. Headache may be more prevalent in football, so comparing football to other sports may be useful in the future. Finally, the concussion history in our study was based on self-reported information providing concussion history for the individual's lifetime, which, although often used to gather demographic information, could lead to bias and lack of reliability. This potential bias cannot be removed from the study; however, this study does provide some insight into athletes' self-reporting a history of concussion and self-reporting increased headache-related disability.

CLINICAL APPLICATIONS AND FUTURE RESEARCH

The MIDAS results, combined with the data on previous concussions, show that there are long-term concussion effects that manifest as reported moderate or severe disability but that might not be reflected in increased frequency or severity of headache following concussion. Clinically, the information from these findings can be used to better understand headache in athletes and reinforce the possible effect of previous concussion history on long-term health. This study also highlights the need for further use of outcome-based measures in the athletic population following injury, specifically concussion. Some of the possible weaknesses of using a generic-based scale such as the MIDAS are suggested in our findings, including lack of specificity to the athletic population and activities of this type of population.

Future research in this area could be expanded to include a variety of sports and athletes of various ages. A more specific instrument geared toward assessing the impact of headache on athletic performance may be usefully developed and validated for identifying disabilities and characteristics of headache in athletes. Comparing a more specific instrument to a previously validated instrument such as the MIDAS may also provide needed information. Finally, this study design has proven feasible, yielding a significant amount of data for this population, and it will be a useful model for future studies to examine outcomes related to quality of life in the athletic community.

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