Attitudes of Central Collegiate Hockey Association Ice Hockey Players Toward Athletic Mouthguard Usage

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Abstract

Objective: *The purpose of this study was to examine Central Collegiate Hockey Association ice hockey players' attitudes regarding the use of athletic mouthguards and to determine the effects of mouthguard type, player position, education, and usage time with respect to attitudes.* ***Methods:*** *A questionnaire measuring players' attitudes toward mouthguards was sent to certified athletic trainers (ATC) responsible for providing healthcare coverage at 10 institutions of the Central Collegiate Hockey Association (CCHA). The ATC's distributed the surveys to all the players on their respective collegiate teams. Out of a total of 265 players listed on the roosters of the CCHA, one hundred and sixty five (62%) players returned the surveys, with 158 surveys used in the analyses (60%).* ***Results:*** *Approximately 13.3% of players (n=21) reported wearing mouthguards 50% of the time or greater during games and 3.8% (n=6) reported wearing mouthguards 50% of the time or greater during practices. Twenty-six percent (n=41) of the players never received educational information regarding using mouthguards. Thirty-nine percent (n=59) of the players reported altering mouthguards to obtain a better fit while 91% of the players were not influenced by the cost of the mouthguard. A 2 x 2 x 2 ANOVA revealed a significant interaction among player position and mouthguard type with respect to player attitudes ($F_{1,131} = 4.96$, $P < 0.05$), with defensive players having more negative attitudes toward mouthguard usage compared to offensive players.* ***Conclusion:*** *No one specific factor affecting attitudes was identified, however, players reported limited educational opportunities to learn about the effectiveness of mouthguards. Therefore, coaches, dentists, and healthcare providers should engage in more preventive educational programs to increase player attitudes and compliance.*

Key Words: compliance, sports participation, perceptions, custom fabricated, orofacial trauma, and education

Introduction

Since the first regulations in 1962 requiring mouthguards for high school and junior college football players (1,2) the National Collegiate Athletic Association (NCAA) and the National Federation of State High School Athletic Associations (NFSHSAA) now mandate the use of mouthguards for participants of football, lacrosse, field hockey and ice hockey. (3,4) However, many athletes participating in contact sports such as basketball, rugby, water polo, and wresting run a substantial risk for suffering orofacial trauma because they choose not to wear mouthguards. Research has suggested that when used properly, mouthguards reduce the morbidity of orofacial trauma (5-11) and possibly cerebral injuries (4,6,12-14).

Research has examined the physical properties and characteristics necessary in constructing a comfortable and more importantly, a practical mouthguard to increase athlete use and compliance. (15-18) To ensure compliance, the NCAA has established rules requiring the use of brightly colored mouthguards in football. (19) Even with the overwhelming evidence supporting mouthguards and the regulations requiring their use, compliance and enforcement of these regulations by officials and coaches, (19,20) remain a concern for many healthcare professionals. The crux of the problem, particularly those related to athlete compliance, is perhaps related to the athletes' attitudes toward the use of mouthguards.

Even though NCAA regulations require mouthguards in men's ice hockey, Hawn, Visser, and Sexton (21) found 52% of Division I ice hockey players reported wearing mouthguards while participating in sanctioned games. The challenge faced by dental and other healthcare professionals is identifying techniques to promote the use and acceptance of mouthguards and continue to enforce the use in sporting activities. Increasing compliance requires a continual effort in identification of potential limitations and attitudes towards mouthguards. Therefore, the purposes of our study were to examine the attitudes of Central Collegiate Hockey Association (CCHA) ice hockey players regarding the use of mouthguards and to determine the effects of mouthguard type, player position, education level, and usage time with respect to attitudes towards mouthguards.

Methods

Subjects. The population selected for our study was NCAA Division I collegiate men's ice hockey players from the CCHA during the 2002-2003 season. A listing of the academic institutions sponsoring men's ice hockey in the CCHA identified 12 institutions. We contacted the certified athletic trainer (ATC) responsible for the healthcare of each team at these institutions soliciting their participation in the study. Ten (83%) ATCs agreed to send us team roosters and distribute and collect questionnaires. The 10 rosters identified 265 athletes, 165 questionnaires were returned,

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with 158 (60%) of these questionnaires usable in the data analysis.

Instrumentation and measurement. To obtain information relative to our purpose, we conducted a review of literature examining mouthguard physical characteristics, athlete attitudes toward mouthguards, and epidemiological data examining injury rates of mouthguard users vs. non-mouthguard users. We designed the *Athletic Mouthguard Attitude Questionnaire*, a 3-section instrument measuring mouthguard usage statistics and attitudes towards mouthguards. Section 1 identified basic demographic information. Section 2 measured mouthguard usage statistics such as current mouthguard used, whether players received any formal education related to using mouthguards and percentage of time worn during practice and games using forced-choice questions. A discrete categorical response (< 10%, 25%, 50%, 75%, and > 95%) was solicited to assess the players' approximate percentage of time mouthguards were worn during practices and games.

The questionnaire's final component attempted to measure players' attitudes towards mouthguards (Table 1). A review of literature using the Sport Discus, Cumulative Index to Nursing and Allied Health Literature, and Health Source: Nursing and Academic Edition database identified factors influencing players' attitudes towards mouthguards. The questionnaire utilized Likert item response categories ranging from "strongly agree" to strongly disagree". Following the recommendations of Muller (22), positively stated Likert items received 5 points for a response of strongly agrees and 1 point for strongly disagrees. Negatively worded items were scored in reverse, 1 point for a response of strongly agrees and 5 points for strongly disagrees. The highest score for the *Athletic Mouthguard Attitude Questionnaire* was 55 (5 x N) (22), indicating a strongly positive attitude. The lowest possible score, indicating a strongly negative attitude was 11 (1 X N). A neutral attitude was scored as 33 (3 x N).

TABLE 1
Athletic Mouthguard Attitude Questionnaire

1. I feel wearing a mouthguard limits my playing ability.
2. I feel mouthguards are bulky.
3. I feel mouthguards are uncomfortable.
4. I feel mouthguards limits the amount of air that I am able to breathe.
5. I feel mouthguards impede my speech.
6. I feel my coaches encourage me to wear a mouthguard during athletic participation.
7. I feel mouthguards provide protection for my mouth and teeth.
8. I feel mouthguards provide protection against concussions.
9. I would be willing to play in an athletic event without my mouthguard.
10. I would be reluctant to play in an athletic event without my mouthguard are an injury to my face.
11. I feel that mouthguards should be enforced in the CCHA by the references and league officials.

Validity and reliability. Five athletic trainers were asked to assess the content and face validity of the *Athletic Mouthguard Attitude Questionnaire*. The panel consisted of four ATCs working with collision sports at the college/university setting, and one ATC working in the clinical/industrial/corporate setting. All panel members were familiar with NCAA and NFHSAA rules and regulations regarding mouthguards and have fabricated mouthguards for collegiate and/or high school athletes.

Reliability analysis was conducted to examine the internal consistency of the *Athletic Mouthguard Attitude Questionnaire*. A Cronbach's alpha of .76 for the total attitudinal score demonstrated good internal consistency. Nunnally and Berstien (23) consider an alpha equal to or greater than 0.70 to be satisfactory in demonstrating adequate internal consistency between items.

Data collection. Questionnaire packages, including a cover letter explaining the study's purpose, directions and research participation forms were mailed to the ATCs between December 2002 and January 2003. Completion and return of the questionnaire indicated that each participant had read and/or had the purpose and study requirements explained and agreed to participate in this study. Two follow-up phone calls were made to each participating athletic trainer reminding them to collect the surveys from their team. Approval for the study was granted from the Western Michigan University Human Subjects Institutional Review Board.

Statistical analysis. We calculated means and standard deviations for the player's age, years playing in the CCHA and attitudes towards mouthguard. A 2 x 2 x 2 analysis of variance (ANOVA) investigated the main effects and interactions between player position (offensive vs. defensive players), mouthguard type (prefabricated, including stock and boil-and-bite vs. custom-fabricated, including pressure laminated and vacuum fitted), and previous mouthguard education (yes, meaning the athlete had received instructions on mouthguard use vs. no, the athlete never received instructions on mouthguard use) with respect to mouthguard attitudes. Post-hoc analysis using multiple pairwise comparisons based on a *t*-statistic; adjusted with a Sidak correction procedure was used when there was significance.

We used independent *t*-tests to determine differences in mouthguard attitudinal scores across groups defined by reported player mouthguard usage time during practice and games (wearing mouthguards < 50% and ≥ 50% of the time). All statistical testing was two-tailed with the level of statistical significance set a-priori at $P < 0.05$. The Statistical Package for Social Sciences (version 9.0, SPSS, Inc., Chicago, IL) was used to calculate the statistics.

Results

One hundred sixty-five (62%) players responded to the questionnaires with 158 (60%) usable questionnaires. Seven (2%) questionnaires were returned blank or section 3 of the questionnaire was not completed. Average age of CCHA players was 20.99 ± 1.67 with players averaging 2.19 ± 1.16 years in the CCHA. Forty-three percent (n=68) of the participants played in a defensive position while 57% (n=90) played an offensive position.

Eighty two percent (n=129) wore custom fabricated mouthguards, while 6.3% wore prefabricated (n=10) mouthguard. The remaining players (12%, n=19) were not familiar with the type of mouthguard they were wearing. While practicing, 3.8% of the players reported wearing mouthguards 50% of the time or greater, while 13.3% reported wearing mouthguards 50% of the time or greater during ice hockey games (Table 2).

players either received information form miscellaneous individuals (16%) or from family and friends (3%).

The mean attitudinal score was 28.8 (± 5.9) indicating an overall negative attitude toward mouthguards. By player position, defensive players' mean attitudinal score was 28.2 (± 5.3), while offensive players' mean attitudinal was 29.2 (± 6.1), again indicting an overall negative attitude toward mouthguards. An examination of the barriers influencing these negative mouthguard attitudes revealed that 63.9% of players agree or strongly agree mouthguards are bulky, while 74.7% agree or strongly agree mouthguards are uncomfortable. When asked about impact of mouthguards on player's ability to breath and speak, 84.8% and 72.8% respectively agreed or strongly agreed that mouthguards limit the ability to breath and speak while playing. However, considering these factors, only 37.3% agree or strongly average

TABLE 2
Mouthguards utilization according to player position during practices and games reported as frequencies

	Proportion of Time Used				
Player Position	<10%	25%	50%	75%	>95%
	Practice (n=158)*				
Defensive	68	0	0	0	0
Offensive	82	2	2	2	2
	Games (n=158)*				
Defensive	63	0	1	1	3
Offensive	70	4	2	2	12

* Scores are reported as frequencies.

Thirty-seven percent (n=59) of the players reported altering mouthguards to obtain a better fit while 91% of the players were not influenced by the cost of the mouthguard. Twenty-five percent (n=40) of the players reported never receiving educational information regarding the use of mouthguards, while 56% of those receiving information did so from a health care provider. The remaining

that the ability to play is affected while wearing a mouthguard.

A 2 x 2 x 2 ANOVA revealed a significant higher order interaction among player position and mouthguard type with respect to attitude scores ($F_{1, 131} = 4.96$, $P < 0.05$). The effects of the players' attitudes suggested that defensive players wearing prefabricated mouthguards (23.80 ± 3.42) had more negative attitudes towards mouthguards compared to offensive players (33.40 ± 3.50) also wearing prefabricated mouthguards. Offensive players wearing custom fitted mouthguards (29.67 ± 6.18) had more negative attitudes towards mouthguards compared to the offensive players wearing prefabricated mouthguards (33.40 ± 3.50). However, defensive players wearing custom fitted mouthguards (28.76 ± 5.45) had more positive attitudes towards mouthguards compared to defensive players wearing prefabricate mouthguards (23.80 ± 3.42).

Independent *t*-tests ($t(137) = -4.97$ 5, $P < 0.05$.) revealed players wearing mouthguards 50% of the time or greater while practicing (40.00 ± 7.4) had positive attitudes towards mouthguards compared to players wearing mouthguards less than 50% of the time (28.75 ± 5.39). An independent *t*-tests ($t(137) = -6.75$, $P < 0.05$) also revealed more positive attitudes for players wearing mouthguards 50% of the time or greater during games (36.19 ± 5.3) compared to players wearing mouthguards less than 50% of the time (28.00 ± 5.05).

Discussion

When used properly and consistently, mouthguards can prevent roughly 200,000 orofacial injuries per year with athletes participating in high school and college football alone (3,4). Despite this fact and the continued improvements in mouthguard design, athletes continue to convey negative attitudes toward mouthguard usage. Our findings indicate that although a majority of CCHA players believe mouthguards offer protection against orofacial trauma (87.6%) and concussions (89.5%), only 17.1% of the players reported using a mouthguard 50% of time or greater during practice and competition. Our results also suggest players wearing mouthguards 50% of the time or greater demonstrated more positive attitudes toward mouthguard usage.

Two potential explanations for the inconsistent mouthguard use found in our study include: inconsistent enforcement by the coaching and/or medical staff and the lack of educa-

tional knowledge among players regarding mouthguards. Hawn *et al.* (21) hypothesized that enforcement and compliance of mouthguards among NCAA Division I hockey players would be greater because of the increased likelihood of playing professionally, making players more aware of the potential risks of sustaining a serious injury. However, their examination of mouthguard enforcement and compliance among NCAA hockey programs found 51% of NCAA Division I ice hockey players reported inconsistent usage during athletic competition. These results are comparable to Chapman's finding during his examination of the National Team Rugby player's attitudes toward mouthguards (24-26). Although approximately 95% of the members of the rugby teams studied believed mouthguards reduced the risk orofacial trauma, 20-50% of the participants reported not wearing mouthguards regularly during competition. While our study did not directly assess enforcement of mouthguard use, when players were asked about their feeling toward enforcement of mouthguards, 75% (n=119) of the players felt mouthguards should be enforced in the CCHA. This suggests that increasing the level of enforcement may correlate with an increase in compliance and a possible decrease in injury rates.

Hawn *et al.* (21) reported that 11% of ATCs and 25% of coaches/ATCs combined encouraged the use or enforce the rules related to mouthguard usage among Division I and Independent players. At all levels, 32% of ATCs and 42% of coaches encourage the use or enforcement of mouthguard usage. Similarly, Division I ice hockey referees only assessed three penalties for mouthguard violations compared to 14 in Division III. In comparison, football officials from the Big East Conference believed that assessing a penalty for a mouthguard violation was inappropriate (18%) or believed that it is not worth the hassle dealing with players and coaches (12%) (19).

The lack of enforcement of mouthguard rules by the officials, coaches, and the medical staff is not the only culprit when it comes to inconsistent use and negative attitudes toward mouthguards among ice hockey players. Players themselves must be held accountable for their actions or rather inactions when it comes to compliance. Player compliance is dependent upon not just the type of mouthguard worn, but also whether or not athletes have been provided with educational information focusing on the importance of and care for mouthguards. Our results suggest that one-quarter of CCHA players never received any formal educational instruction concerning the benefits, maintenance, and usage of mouthguard, either by a coach, dentist or healthcare professional. This is consistent with Yamada *et al.* (27) results of oral injuries and mouthguard usage in Japan. They found that 27% of soccer players were unaware of the importance of mouthguards. One factor accounting these results is that soccer is often not considered a sport where mouthguards are used regularly, making generalizations to a sport like hockey where mouthguards are mandated more difficult.

In either case, the lack of proper education from trained professionals forces athletes to rely on inaccurate information and/or biased-negative opinions from teammates, coaches, or parents regarding the use of mouthguards. Lack of proper education also means athletes are unaware of the different type of mouthguards available. This supports previous research findings where only 13% of coaches provided some type of educational program for their athletes about the purported benefits of mouthguards (28). Additionally, Diab and Mourino (29) found that 75% of athlete's parents never received formal training or lack adequate knowledge concerning the care, maintenance, and usage of mouthguards. In fact, Walker, Jackobsen and Brown (30) found that even though parents of 7- and 8-year-olds believed that mouthguards protect against injury, only 24% would be willing to pay more than $25.00 for a mouthguard. This unwillingness to pay for a mouthguard forces athletes into prefabricated mouthguards offering limited comfort and protection.

Players in our study were more likely to alter the design of mouthguards, making them more comfortable and possibly contributing to the negative attitudes toward usage. Chapman (24-26) found that rugby players choose not to wear mouthguards because they were uncomfortable, offered feelings of nausea, or difficulty with breathing and/or speaking. These factors are shared by many athletes and are often attributed to improperly fitted mouthguards (31). Proper fit and comfort is also correlated with athlete compliance (32) and is related to the enthusiasm athletes demonstrate toward using mouthguards consistently (33).

Problems associated with improper fit can be corrected by using a custom fabricated mouthguard early on in an athlete's career or by allowing players to become acclimated to the mouthguard by wearing them in all practices and training sessions. DeYoung, Robinson, and Godwin (34) compared comfort and wear ability of custom fabricated and prefabricated custom-adapted mouthguards. The results of the study showed significantly more comfort-related complaints with the prefabricated custom-adapted mouthguard than with the custom fabricated mouthguard. In our study, most players (82%) wore custom made mouthguards, however, many athletes still found their mouthguards to be bulky (63.9%), uncomfortable (74.7%), limited the ability to breathe (72.8%), and impeded speech (84.8%).

Furthermore, player position affects athletes' attitudes toward mouthguard use and compliance. Quarterbacks, in particular, believe that mouthguards interfere with their ability to call signals (35). We found that defensive hockey players reported more negative attitudes toward mouthguard usage and were less compliant compared to offensive players. Perhaps these differences in attitude between players' positions stems from the role of the defensive position. Defensive players similar to a football quarterback may be required to engage in more verbal di-

rections compared to offensive players or perhaps they engage in higher level of physical exertion such as in checking and hitting. These are only speculations and more research is necessary to examine differences in attitudes and compliance related to ice hockey player position.

Although mouthguard usage may be effective in preventing some orofacial trauma and concussions, many ice hockey players still do not wear them regularly. Attitudes differ among players as a result of their position suggesting that the attitudes and roles of the position may dictate compliance of mouthguard usage. In addition, players may still not be receiving adequate educational information concerning the importance and compliance with mouthguard usage. Coaches, dentists, and other allied health professionals must adequately promote and educate athletes about the benefits of mouthguards and to decrease the negative stigma associated with mouthguard usage.

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