

RAPID COMMUNICATION

Serum Testosterone and Aggressiveness in Hockey Players

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INTRODUCTION

The relationship between aggressive behavior and testosterone in man has not been clarified [1]. This paper reports preliminary data from a study designed to examine the relationship between serum testosterone concentration and aggressive behaviors in competitive hockey players. Competitive sports, and particularly hockey, offer the opportunity to study aggressive behavior in a natural setting. Aggressive behaviors in such settings are frequent, observable, socially acceptable and often necessary. Thus the methodological problems involved in using self-report measures of aggressive behaviors are circumvented.

In competitive hockey, outbursts of violent behaviors, occasionally leading to injury, have been known to occur. Unlike the larger society in which violent crimes

occur, hockey presents each individual with a known and relatively uniform stimulus for aggressive behaviors. Thus, this setting seems well-suited for studying the relationship between testosterone and various components of aggressiveness.

METHOD

Subjects were 14 male varsity college hockey players, all members of a nationally ranked team consisting of 18 players. They ranged in age from 18 to 23, with a mean age of 21.6 years and gave informed consent before participation. Each of the two team coaches independently rated each player on a 7-item scale designed to assess a range of behaviors related to aggressiveness (Appendix A). Each item was scored on a scale from 1 to 5, with higher scores indicating a greater degree of the rated quality. Blood samples were obtained by venipuncture between 3:30 p.m. and 4:00 p.m., prior to a practice session. A second sample was obtained one week later from 9 to 14 players who participated in the study. In order to maintain as large a sample size as possible and since the second group of nine might represent a biased subgroup of the original 14, only the first sample was utilized for data analysis. Serum was separated and frozen until assay. Testosterone was measured by radioimmunoassay using a specific antibody to testosterone and column chromatography to separate testosterone from competing steroids [2]. Average recovery is 78.4%. The interassay coefficient of variation (CV) is 7.0% and the intra-assay CV is 6.5%. All

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samples were measured in duplicate in the same assay.

RESULTS

Ratings on each aggressiveness item ranged from 1 to 5. Since the interrater reliability was quite high (see Table 1), the mean value of the two ratings was used for correlational analysis. Six of the items (1, 2, 3, 5, 6, 7) were highly inter-correlated (.832-.979).

Serum testosterone concentration ranged from 3.7 to 8.1 ng/ml, with a mean of 6.2 ng/ml. While 6 of the 7 aggressiveness items showed positive correlation with serum testosterone, only item 6 (response to threat) was significantly correlated (Table 1).

DISCUSSION

This study in demonstrating a positive correlation between degree of aggressive response to threat and serum testosterone is consistent with previous studies demonstrating relationships between testosterone and aggressive behaviors in crim-

inal populations [3, 4, 5]. Furthermore, the observation of a selective relationship between one parameter of aggressive behavior (response to threat) and serum testosterone is intriguingly consistent with Rose et al.'s observation that plasma testosterone levels covary with changes from dominance to submission in monkeys [6]. Further speculation on the implications of these findings are unwarranted in view of the preliminary nature of these data.

Multiple samples, controlled for time of day are necessary to accurately characterize an individual's testosterone level. Our study, which utilized only one sample, must remain preliminary and await confirmation utilizing multiple samples.

Of greater importance than these preliminary data is the demonstration of the feasibility of using competitive hockey, and perhaps other sports, as a model in which to study aggressive behavior. We found that the coaches could reliably differentiate the aggressiveness of their players. This model may also provide other potential indicators of aggressive behavior such as penalty minutes or rule infractions.

TABLE 1. Item Ratings, Standard Deviations, Reliability, and Correlation with Serum Testosterone

	Mean rating	S.D.	Inter-rater Reliability	Correlation with Serum Testosterone
Leadership (item 1)	3.3	1.3	.887	.199
Competitiveness (item 2)	3.7	1.3	.908	.182
Offensive play (item 3)	3.8	1.2	.836	-.110
Frustration tolerance (item 4)	3.9	.95	.934	-.105
Body contact (item 5)	3.6	1.1	.773	.384
Response to threat (item 6)	3.9	1.3	.828	.545 ^a
Global aggressiveness (item 7)	3.9	1.0	.618	.358

^a(*P* < .05).

APPENDIX A

Name of Player: _____

Age: _____

Please fill out this scale for the player listed at the top. Try to be as objective as possible and rate his qualities without concern for what this may mean or imply. This information is *for research purposes only* and will *not* be available to player, press, etc. Thank you.

Please rate this player on the following characteristics:

(1) Leadership Qualities:

- _____ This player demonstrates superior leadership qualities.
- _____ This player demonstrates above average leadership qualities.
- _____ This player demonstrates average leadership qualities.
- _____ This player demonstrates below average leadership qualities.
- _____ This player demonstrates poor leadership qualities.

(2) Competitiveness:

- _____ This player is extremely competitive, demonstrating an intense desire to win, maximum effort at all times.
- _____ This player is above average in competitive drive.
- _____ This player is average in competitive drive.
- _____ This player lacks adequate competitive spirit.

(3) Offensive Play:

- _____ This player is very offensive, attacking in his style of play, willing to utilize force to accomplish his objectives.
- _____ This player is above average in offensive, attacking style of play.
- _____ This player is average in offensive, attacking style of play.
- _____ This player is below average in offensive, attacking style of play.
- _____ This player lacks offensive, attacking style of play and is unwilling to utilize force to accomplish objectives.

(4) Frustration Tolerance:

- _____ This player, when frustrated, is always able to maintain control of his temper.
- _____ This player, when frustrated, is usually able to maintain control of his temper.
- _____ This player, when frustrated, is occasionally unable to maintain control of his temper.
- _____ This player, when frustrated, is often unable to maintain control of his temper.
- _____ This player, when frustrated, is unable to maintain control of his temper.

(5) Body Contact:

- _____ This player is always willing to utilize body contact or physical force in competitive situations.
- _____ This player is almost always willing to utilize body contact or physical force in competitive situations.
- _____ This player is occasionally willing to utilize body contact or physical force in competitive situations.
- _____ This player is rarely willing to utilize body contact or physical force in competitive situations.
- _____ This player is reluctant to utilize body contact or physical force in competitive situations.

