

Think you're getting a great workout? You are!

by Dan Graetzer and Barry Schultz

A University of Utah faculty research grant study compared the characteristics of rallies and match play in handball, smacquetball and racquetball. In addition, the study looked at cardiovascular and metabolic responses of the competitors.

This writeup will describe differences in rally and match play characteristics among these three sports in the following areas:

- Average time in play per rally.
- Percentage of time in play per 60minute match.
- Time-in-play/out-of-play ratio within a 60-minute match.
- Average number of hits per rally.
- Total rallies per 60-minute match.
- Total number of hits per 60-minute match.

We all know what handball and racquetball are, while smacquetball involves strapping fiberglass hand paddles to both hands and requires the ambidexterity of handball but without the associated hand pain. See the February 1994 issue of Handball magazine for it full article comparing heart rate during the three sports, and the October 1994 issue for an article comparing oxygen uptake from which is calculated metabolic rate, or caloric burn.

Ten members of the Utah Handball Association participated in this study: Steve Apple, Gary Scoggins, Lon Stalsberg, Paul Haanstad, Darrell Hensleigh, Dan Graetzer, Frank Hammer, Bob Nydegger, John Surfustini and Rick Ryerse.

These players (age, 40.2 +5.9 years; height, 182.2 +7.9 centimeters; weight, 83.12 +6.95 kilograms; body fat, 14.70 +6.48 percent) were all top finishers in the open/ A class of the Utah state handball tournament. They played each of the three sports against an opponent of similar ability.

The matches were separated by four to seven days and conducted in random order. Every rally during every 60-minute match was assessed using a stopwatch and counter device to determine the rally and match play characteristics listed in the table at the top of this column

The average amount of time the ball was in play per rally was highest during handball at 9.81 seconds, followed by smacquetball at 8.18 seconds and then racquetball at 6.72 seconds.

The percentage of time the ball was in play within a 60-minute match was highest during handball at 47.0 percent, followed by smacquetball at 45.9 percent and then racquetball at 43.2 percent.

These percentages are also reflected by time-in-play/out-of-play ratio values of 0.87, 0.84

and 0.76, respectively. This ratio is often used in the exercise science literature to assess the amount of actual exercise time in comparing other sports, such as squash and tennis.

The average number of hits per rally was highest during handball at 5.20, followed by smacquetball at 4.89 and then racquetball at 4.79.

The total number of rallies per 60-minute match was 172.4 during handball, followed by 201.6 during smacquetball and 221.4 during racquetball.

The total number of hits per 60-minute match was 896.8 during handball, 985.6 during smacquetball and 938.0 during racquetball.

Descriptive analysis such as these provide valuable information for physical therapists who prescribe exercise and issue rehabilitation guidelines for athletes to return to their sports after sustaining an injury.

Quantitative determination of the amount of stress given to a body part, such as the shoulder or elbow, is important. For example, the therapist then can help a baseball player determine the number of pitches that can be thrown safely, or help a tennis player determine the number of swings to be hit, and so on.

Heart rate, determined by radio telemetry monitors strapped around the chest, and oxygen uptake, determined by indirect calorimetry using an exhaled gas-collection facemask and backpack apparatus, were also recorded every 15 minutes during play. The study found that heart rate was highest during handball at $164.1 + 11.2$ beats per minute, as compared with smacquetball at $143.7 + 14.3$ and racquetball at $136.6 + 15.7$.

Oxygen uptake during handball, at $30.2 + 4.4$ milliliters of oxygen per kilogram of body weight per minute, was higher than smacquetball's rating of $28.0 + 3.5$ or racquetball's $25.8 + 4.6$.

These data indicate that the amount of time the ball is in play, as well as the number of hits per rally, is greatest during handball.

The results also show that the intensity of exertion during handball is greater than during smacquetball or racquetball.

More data from this University of Utah study will be described in future issues of Handball magazine.

A Court Sports Comparison

Parameter	Handball	Smacquetball	Racquetball
Time in play per rally (sec)	$9.81 + 7.27$	$8.18 + 5.79$	$6.72 + 4.66$

Time in play (%)	47.0 +5.2	45.9 +2.5	43.2 +2.1
Time in-play/out-of play ratio	0.87 +0.25	0.84 +0.11	0.76 +0.11
Hits per rally (#)	5.20 +3.59	4.89 +4.49	4.79 +3.53
Total rallies per 60 min. (#)	172.4 +13.2	201.6 +13.3	211.4 +13.2
Total hits per 60 min. (#)	896.8 +98.9	985.6 +66.4	938.0 +39.2

(numbers after + indicate variances)