ABSTRACT

Ski jumping has a long, rich tradition in the Eau Claire area. Recently, kinesiology faculty were approached by the coach of the United States Ski Jumping Association – Central Division Junior Team to determine the feasibility of regular formal fitness assessments of his athletes. The goals were: 1) to help the coach design individualized training programs for each athlete’s needs, 2) to encourage the athletes to maintain their workouts in the off-season, and 3) eventually to determine which fitness parameters best correlate with success on the ski jumping hills.

Initially, eight ski jumpers, ages 10-17 were tested for aerobic capacity, body composition, explosive power, and flexibility/balance. At the second round of pilot testing in November 2006, ten athletes were tested. To date, nineteen kinesiology students have helped in this service project. We hypothesized that the athletes would surpass the general population on some, but not all, of the fitness parameters. Indeed, eight of the ten showed high aerobic capacity (>70th percentile, NCYFS endurance test), low-back and hamstring flexibility. In future testing, we will assess whether changes in training based on these fitness variables have been effective in improving ski-jump performance.

INTRODUCTION

• For almost a century, Eau Claire has been home to the Flying Eagles Ski Jump Club which hosts annual ski jumping competitions for both youth and adult competitors.
• Ski jumping is scored by a unique combination of not only distance covered in the air, but also style points awarded by a panel of judges.

• There are 4 phases to a successful jump:
  1) the inrun (downward acceleration in the crouched position)
  2) the take-off (the explosive extension of the body at the end of the inrun)
  3) the flight (control of body in proper angle to wind, skis in V)
  4) the landing (telemark, with one leg in front of the other)

Nordic Combined adds an endurance test – a 15 km free-style cross country ski race the day after the ski jumping.

• In 2006, UWEC faculty were approached by the coach of the United States Ski Jumping Association – Central Division regarding our capability of testing their young athletes’ fitness levels.

• Although the athletes regularly participate in informal testing, their coaches sought more formal assessment in order to track better quality data on the jumpers, to better design individualized training programs, and eventually to correlate the fitness parameters to success on the ski jumping hills.

• The coach has appreciated the increased precision in physical assessment of the athletes and has utilized the results of the fitness assessments in his training program design.

• The kinesiology students who have helped in this service project have gained valuable, practical experience in addition to an increased appreciation for working with young, competitive athletes.

METHODS

Subjects

• Twelve competitive ski jumpers and Nordic Combined skiers (ages 10-17).
• All subjects are members of the USSA-Central Division; some are junior Olympians.
• Data was collected once during pre-season and once at the end of the season.
• Each round of testing was completed in one day.

Procedures

• Aerobic capacity was first measured by VO_2max, using a treadmill protocol and one of two metabolic carts (SensorMedics Corp., Yorba Linda, CA; MedGraphics Corp., St. Paul, MN). During the second round of testing, aerobic capacity was estimated from a 1-mile run. Heart rate was measured with a Polar Heart Rate Monitor (T31, Polar Electro Inc., Woodbury, NY).

• Body composition was initially measured through hydrodensitometry, and secondly through skinfolds of the triceps, subscapular, abdomen, thigh, calf, chest (males) and suprailiac (females) using a Lange Skinfold Caliper (C130, Beta Technology Inc., Cambridge, MD).

• Sport-specific explosive power was tested by:
  10m, 20m, and 50m sprints
  Standing broad jump, and a sequence of 5 broad jumps
• Vertical jump (Electric Timing Mat)

• Flexibility was measured using a standard sit-and-reach protocol.

• Balance was assessed using the Stork Test.

• Muscular endurance of the trunk was tested with sit-ups timed for one minute.

Statistics

• Descriptive statistics included: mean, standard deviation.
• Pearson’s r correlation was used to determine relationships among the variables.

RESULTS

Sample Data for Group Analysis: 1st Testing Session

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<th>Subject</th>
<th>Age</th>
<th>Sex</th>
<th>% Fat</th>
<th>BMI</th>
<th>Pulse</th>
<th>Distance (m)</th>
<th>VO_2 Max (ml/kg/min)</th>
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Sample Subject Data: 2nd Testing Session

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SUMMARY AND CONCLUSIONS

• Two rounds of pilot testing have indicated that this battery of fitness tests is in fact feasible and effective in this population.

• We did, indeed, find that the athletes scored higher than their peers in some fitness parameters, but just average or even below average in other variables.

• Though we do not yet have a large subject pool, we are just now starting to look at correlations between the jumpers’ improvements on the hill from 2006 to 2007 and their laboratory fitness parameters.

• The young ski jumpers have participated enthusiastically in the tests and are beginning to understand the benefit and application of regular physical assessment.

• The coach has appreciated the increased precision in physical assessment of the athletes and has utilized the results of the fitness assessments in his training program design.

• The kinesiology students who have helped in this service project have gained valuable, practical experience in addition to an increased appreciation for working with young, competitive athletes.

REFERENCES


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