KNEE SYMPTOMS AND FUNCTION IN PROFESSIONAL SKIERS: CAN KNEE SUPPORT HELP?

Michael J. Decker, Ph.D.
Human Dynamics Laboratory, University of Denver, Denver, CO USA
email: mike.biomech@gmail.com

INTRODUCTION

The population of professional ski instructors and patrollers ski on average 110 days per season and are at a considerable risk for knee injury [5]. Educational seminars on ski equipment, fall training programs, higher standards of slope preparation and skier codes of responsibility are the major programs that ski resorts make use of to reduce the chance of a skiing injury yet traumatic knee injuries are at a higher rate now than 20 years ago [1]. Further, a previous knee injury is a major risk factor for an additional injury and the eventual development of knee osteoarthritis (OA) [1,2]. External knee support devices have been shown to reduce the risk of secondary injury during skiing [3] but it is currently unknown if a knee support device can improve the symptoms and function in professional skiers with a history of knee injury. The purpose of this study was to compare self- reported measures of knee symptoms and function between professional skiers with a history of knee injury and those with no history (control); and whether skiing with a knee support device can influence these measures.

METHODS

Self-reported measures of knee symptoms and function were collected weekly over three consecutive weeks of skiing from 88 (53 men; 35 women) professional ski instructors or patrollers from eight ski resorts (Aspen, Beaver Creek Breckenridge, Heavenly, Keystone, Northstar, Vail, Taos). Upon the participant's written informed consent, the International Knee Documentation Committee (IKDC) and knee injury history questionnaires were completed to classify the skier's knee impairment and study group inclusion. The Western Ontario McMasters (WOMAC) questionnaire measuring knee function and four, 15 point Visual Analogue Scales (VAS) measuring muscular fatigue and recovery, knee pain and stiffness were completed at the end of each week. Measurements during weeks 1 and 3 (pre, post) were considered as the baseline values of knee function and symptoms while skiing. During week 2 (OPX), the ski professionals performed all skiing while wearing knee support tights under their ski pants. These tights were constructed of 2 types of overlapping fabrics with different elastomeric properties that are specifically located in the garment to provide multidirectional knee support (Opedix LLC, Scottsdale, AZ). Two-way, mixed factor repeated measures ANOVA and Bonferroni post-hoc tests were performed over 3 weeks of skiing for the professional skiers with and without a history of knee injury on the following variables: Total WOMAC score, VAS fatigue during skiing, VAS fatigue recovery after skiing, VAS pain during skiing, VAS stiffness during skiing, and total skiing time. An unpaired t-test was used to determine whether the knee impairment score measured with the IKDC was different between groups. All statistical testing employed an alpha level of .05.

RESULTS AND DISCUSSION

Fifty nine (25 men, 35 women) of the professional skiers (67%) reported a history of knee injury. No statistical differences were found for total time skiing between groups or weeks (all $p>.05$). Compared to the control group, knee impairment measured with IKDC was 11% greater ($p=.001$) and knee function measured with the total WOMAC score was 17% lower for the knee injury group ($p=.02$). Group means for the dependent variables collapsed across groups for each week of skiing are presented in **Figure 1**. These data demonstrated quadratic trends (all $p<.05$) and were on average 25% lower (improved) while skiing with knee support during week 2 compared to the baseline condition at week 1 (pre vs OPX, all except VAS stiffness, $p<.05$). All variables returned to baseline while skiing without knee support during week 3 (pre vs post, all $p>.05$).

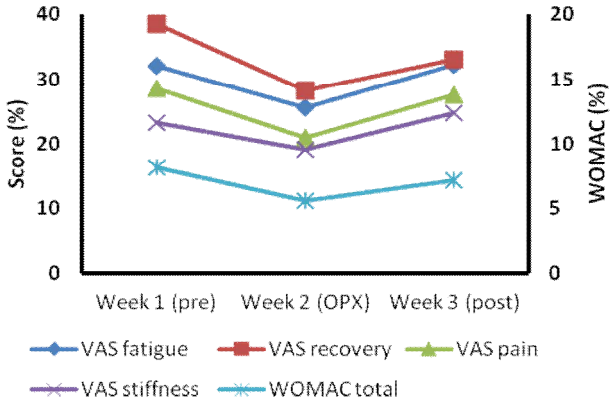

Figure 1: Dependent variables collapsed across groups measured over three consecutive weeks of skiing. Knee support was worn during week 2. Lower scores indicate less symptoms and greater function.

CONCLUSIONS

Compared to controls, skiers with a history of knee injury demonstrated greater knee impairment and less knee function but no differences in knee symptoms or fatigue during skiing. Wearing knee support constructed of a combination of fabrics during skiing reduced self-reported measures of muscular fatigue and knee pain and enhanced muscular fatigue recovery and knee function.

REFERENCES

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