Different Ankle Joint Energetic Pattern between Subjects with Copers and Ankle Instability

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Lateral ankle sprains are common sport-related injuries, which often lead to ankle instability (AI) or may not develop into AI (coper). Identification of coper energetic patterns may clarify underlying injury pathomechanics, which can help us better understand AI. **PURPOSE**: To examine if AI and coper subjects demonstrate different ankle joint power patterns during a forward-side jump when compared to controls. **METHODS**: 19 AI (22.9±2.0yrs, 175.3±10.7cm, 73.7±12.2kg), 19 Coper (22.1±2.2yrs, 173.9±8.2cm, 72.9±12.9kg) and 19 control subjects (21.6±2.5yrs, 172.9±7.7cm, 68.4±10.8kg) were categorized according to the FAAM and the MAII. They performed 5 forward-side jumps on the force plate. Joint power (W/kg) was measured during the landing (eccentric power: 0-50% of stance) and take-off (concentric power: 50-100% of stance) phases of a forward-side jump, which was from initial foot contact to take-off. Functional linear models (α=0.05) were used to evaluate differences between two groups (AI vs control; coper vs control) for ankle joint power. This analysis compared variables as polynomial functions rather than discrete values. Functions of each group as well as 95% confidence interval (CI) bands were plotted to determine significant differences. **RESULTS**: The AI group had greater ankle eccentric power during 0-8% of stance while less ankle eccentric and concentric power during 10-50% and 55-90% respectively compared to the control group ($p<.05$). The coper group showed greater ankle eccentric power during 0-8% of stance and decreased ankle concentric power during 80-90% compared to the control group ($p<.05$). Significant group difference of ankle power between AI and coper groups were found at initial contact and between 10-45% of stance during landing phase and during 55-85% of stance during take-off phase ($p<.05$). **CONCLUSION**: After initial foot contact, the AI group dramatically decreased ankle joint energy absorption throughout the rest of landing phase compared to two other groups. Less shock attenuation by the ankle joint may place more stress on ankle joint, resulting in ankle injuries such as ligament sprains, and articular cartilage lesions. AI subjects showed less ankle concentric power during take-off phase which may lead to performance decrements compared to other groups.