

## **Postural work exposure and ergonomics of riding school employees measured with smart workwear**

### **SUMMATIVE STATEMENT:**

The work environment in the equine sector has been described as labor-intensive with physical, mental, and emotional strain. Furthermore, stable work includes hazardous postural work exposure and studies have shown a high prevalence of musculoskeletal symptoms for employees at Swedish riding schools. The objective of this study is to evaluate the usefulness of a novel method using smart workwear to measure and to quantitatively describe postural exposure during work with horses. The over-all aim is to increase the knowledge of the postural exposure and related risk factors in the equine sector to reduce hazardous exposure, which should decrease musculoskeletal disorders and work-related sick leave.

**KEYWORDS:** work environment, equestrian, postural load, work posture, IMU

### **PROBLEM STATEMENT:**

Globally, the costs of work-related illnesses and accidents are estimated to be 4 percent of a country's gross domestic product annually. For Sweden, this corresponds to approximately SEK 164 billion. Physical strain is one of the most common work-related causes of musculoskeletal disorders, functional impairments, and sick leave. Work-related musculoskeletal disorders can occur when the body is exposed to repetitive movements, heavy lifting, hazardous work postures and/or vibrations. Even though the risk factors are known, too many people still work in unhealthy work conditions that put them at risk of work-related disorders and illnesses.

Employees in the Swedish equine sector is an important empirical setting for exploring and describing postural work exposure and ergonomics. Much of the work tasks in horse stables are still performed manually with old-fashioned equipment and methods. Thus, the work in horse stables continues to involve heavy lifting, awkward work postures, and repetitive work, all identified risk factors for developing musculoskeletal disorders, and studies have shown a high prevalence of musculoskeletal complaints for employees at riding schools.

Over the years, risk assessment methods have been developed and improved. However, these have been largely based on observation, something that has hampered reliability and credibility of the results. Technical measurements have previously been too complicated and resource-demanding for practical usage. With smart work clothes, measuring postural work exposure throughout working days at the workplaces should be easier.

### **OBJECTIVE/QUESTION:**

The overall aim is to increase the knowledge of postural exposure and related risk factors in the equine sector to reduce hazardous exposure, which could reduce musculoskeletal symptoms and work-related sick leave within horse-related occupations in the long run. By enabling simple objective full-day registrations of, e.g., back and arm angles, during the performance of different activities, specific measures to reduce exposure can likely be identified and evaluated.

The specific aims of this study are to 1) evaluate the usefulness of a novel method to measure and quantitatively describe postural exposure during work, 2) map the work postures and hazardous postural exposure, in different work tasks, for employees in riding schools, and 3)

relate the work postures and hazardous postural exposure to factors related to the physical work environment (e.g., mechanization and tools) and the organizational and social work environment (e.g., management, stress, and variation in work).

### **METHODOLOGY:**

The study will be conducted in 8-10 riding schools, and it will include approximately 40 employees involved in stable work. The riding schools have been selected to represent a range of technically advanced facilities and variations in work organization. The participants will be asked to answer the Copenhagen Psychosocial Questionnaire (COPSOQ), a validated questionnaire covering questions about e.g., organization and content of work, relationships, leadership, health and well-being. Full-day postural exposure will be registered for all participants using a technical measurement system, the Smart Workwear System (Wergonic). The Smart Workwear System is designed as a t-shirt with embedded pockets where inertial measurement units (IMUs) are placed. The t-shirt can be worn comfortably during the whole workday while registering the arms and trunk angles. In parallel, the participants will wear sensors for heart rate measurements. The researchers will register work task durations during the workday as well as stress rates and perceived physical exertion.

### **RESULTS:**

The data collection is ongoing, and preliminary results will be presented and discussed at the conference. The result intends to describe working postures and postural exposure of riding school employees during various work tasks, the full-day exposure, and variation over the day, and relate it to the participants' perceived work ability, work pace, and physical exertion. The project is also expected to indicate associations between the organizational and social work environment and the physical work environment. The results will aid in identifying potential measures to improve the work environment and thereby, thereby, the health and well-being of equine professionals. Since limited research has been conducted on this subject, it is important to disseminate the results to other researchers nationally and internationally. The results will be relevant to multiple sectors as the novel method to measure work postures can be used in any context.