Identification of Inflammatory Biomarkers for the Prevention of Tendonitis Caused by Repetitive Manual Assembly Tasks

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Abstract: Work related musculoskeletal disorders (WMSDs), as defined by the National Institute for Occupational Safety and Health (NIOSH), are a group of disorders involving muscles, tendons, nerves and supporting structures. The WMSDs symptoms are the most common occupational disease, imposing limitations in activities of daily living in both manufacturing workers and the general population. Nowadays, there is a debate about the specific cause of long term physiological changes caused by repetitive manual tasks, with brief work cycles and force demanding tasks. Therefore, examining the underlying mechanisms leading to physiological changes is crucial to provide an early detection, diagnosis and appropriate management of WMSDs. The proposed study will include 30 healthy college students over the age of 18 with no previous exposure to forceful and/or repetitive manual tasks for the previous eight weeks before the start of the study, and that are not currently undergoing anti-inflammatory treatment. The participants will complete 1800 cycles of a simple manual task every day for 25 minutes, for four weeks. Blood samples will be collected on the first day to establish baseline values, and after the completion of the task on the fifth day. Blood serum levels of inflammation biomarkers including Interleukin 1β (IL-1β), Interleukin 6 (IL-6), cyclooxygenase-2 (COX-2), and Metalloproteinase 2 (MMP2) will be assessed using commercially available ELISA kits. The weekly biomarker levels will be compared to baseline to evaluate significant changes. The expected results of the study include an inflammatory response at the end of the four-week intervention, and elevated expression of inflammation biomarkers before there is an inflammation response. The results of the study will help to better understand the physiological changes caused by forceful repetitive manual tasks. Furthermore, it will provide the basis for the development of a rapid test to evaluate the risk to initiate the inflammatory response and prevent WMSDs.

Keywords: WMSDs, Biomarkers of Inflammation, Manual Tasks