

Musculoskeletal, nervous, respiratory, and circulatory systems in ergonomics

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Ergonomics: Musculoskeletal, Nervous, Respiratory, and Circulatory Systems
According to Pheasant and Haslegrave (2011), ergonomic injuries are soft tissue injuries as a result of doing common movements incorrectly. The pain associated with ergonomics involves the musculoskeletal, nervous, respiratory, and circulatory systems.

Musculoskeletal system

The musculoskeletal system is made up of muscles and bones, as well as connective tissue including fascia, tendons, bursa, and ligaments. These body parts offer a framework for the body, dictate the level of flexibility, and create movement and force exertion, in addition to sustaining the body weight (Schuenke, Schulte, & Schumacher, 2012).

The human skeleton has 206 bones. The bones' mobility is dependent on muscle contraction. Every muscle is attached by a connective tissue to two or more bones. First, the spine enables bending, twisting, and holding the body in an upright position, along with providing an avenue through the spinal cord for the brain to communicate with the whole body. Fixed postures and prolonged seating causes low back pain. This is as a result of a shift in position of the spine discs. Second, muscles contain thousands of tiny aligned fibers. Muscles are responsible for the movement in the human body. Muscles function to produce motion and force. It generates force by contraction. Muscles use a lot of nutrients and oxygen. The muscle activity results in the production of metabolic wastes, such as, lactic acid and CO₂. In this perspective, prolonged muscle contraction increases muscle fatigue and risk of injury (Kahn & Line, 2008).

Third, tendons are tough and flexible band of fibrous connective tissue which

joins muscles to bones. They transfer forces and movements from the muscles. Most of them run through guiding sheaths and do not stretch. Tendinitis is an inflammation of the tendon that causes point swelling. Next, ligaments are groups of dense, white, fibrous elastic tissue. A ligament connects bones to bones in order to form a joint. Majority of the ligaments limit dislocation. They stabilize and support the joints by holding the joints together. A sprain causes the fibrous elastic tissues to stretch or get torn from the bone (Pheasant & Haslegrave, 2011).

Fifth, fascia is a thin, gelatinous membrane that surrounds and is fused with the blood vessels, muscles, bones, tendons, nerves, and organs throughout your body. It supports, connects, and compartmentalizes various body parts. Strain stretches the fascia leading to pain. Lastly, bursa is fluid-filled sac located at bone joints and it is lined with a synovial membrane. It minimizes friction by easing movement as muscles or tendons pass over the skin or bone. Too much accumulation of the fluid causes inflammation and pain.

Nervous system

The nervous system receives information regarding the environment (sensation) and generates responses to that particular information (motor responses) (Harris & Thomas, 2010). The nervous system comprises of the central/peripheral, autonomic/somatic, sympathetic/parasympathetic systems. The nervous system controls the involuntary as well as the voluntary transmission of signals between the various body parts. It has two major parts: the peripheral nervous system (PNS) and the central nervous systems (CNS) (Sanes, Reh, & Harris, 2011). The CNS comprises of the brain, retina, and the spinal cord. The CNS is responsible for feeling and body

movement. In the CNS, injury interrupts travel of impulse, loss of feeling: tingling or numbness, and minimal or no muscle contraction. On the other hand, the PNS comprises of sensory neurons, clusters of neurons, and nerves that connect to one another and the CNS. Injury results in the loss of feeling.

Respiratory system

The respiratory system is made of organs that enable the intake and exchange of gases (O₂ and CO₂) between environment and body. The process of respiration occurs in the lungs. Respiratory hazards affect the lungs impacting on oxygen supply causing muscle fatigue. Airborne particulates are risk factors for injury.

Circulatory system

The circulatory system is an organ system that allows blood to circulate and transport gases (O₂ and CO₂), nutrients (electrolytes and amino acids), hormones, waste, and blood cells to and from cells. These functions are carried out by the heart and blood vessels. An injury to the heart or blood vessels can be a limiting factor in performing manual work. Mismatch in work demands and abilities of the circulatory system causes muscle fatigue and increases risk of injury. According to Sherwood (2011), carcinogens are risk factors for injury.

References

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