Biomechanical analysis of manual lifting of loads and ergonomics solutions for nursing assistants

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Abstract

Introduction: Many jobs involve manual lifting of loads. Such duties put hospital staff at increased risk of musculoskeletal disorders. Incorrect lifting methods are an important risk factor for low back pain. The present study aimed to analyze the biomechanical loads exerted on the lumbar region of nursing assistants during the manual lifting of 12.5 kg serum cartons in hospital and to provide ergonomic solutions for the prevention of back pain.

Materials and Methods*:* This analytical study was conducted in a hospital in Ahvaz (Iran) during 2013. The desired postures were evaluated through observation and photography. The complex lifting index (CLI) was then calculated based on the National Institute for Occupational Safety and Health (NIOSH) equation. Moreover, the compressive forces on L5/S1 vertebrae were estimated as a quantitative index. The calculations were performed before and after the intervention using 3D Static Strength Prediction Program (3DSSPP). The results were analyzed with regression analysis and t-tests.

Results: The maximum and minimum recommended weight limit (RWL) was seen in the top row (89.9 kg) and the bottom row (44.5 kg), respectively. The highest and lowest compressive force was estimated in the bottom and top rows, respectively (6727 and 3707 Newton). The corrective measures in the workstation led to significant reductions in mean CLI and compressive force.

Conclusion: Simultaneous qualitative and quantitative biomechanical analysis of workstations can result in assessments that are more accurate. Corrective measures based on such analyses would also be able to promote ergonomic conditions.

Keywords: Manual lifting of loads, NIOSH, Back pain, 3DSSPP, Nursing assistants

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