KINEMATICS OF THE PELVIS AND LUMBAR SPINE DURING KNEELING, STOOPING, AND STANDING LIFTS

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Six underground miners (mean age = 42 years) performed twelve lifting tasks (in kneeling, stooping, and standing postures), during which kinematic data of the pelvis and lumbar spine were collected. The lifting task involved lifting heavy electrical cable from the ground to a ceiling of variable height. Postures evaluated included kneeling (lifts to 1.2 and 1.5 meters), stooping (lifts to 1.2 and 1.5 meters), and standing (lifts to 1.8 and 2.1 meters). Lumbopelvic flexion was significantly lower in kneeling tests than in other postures ($p < 0.001$). Pelvic flexion averaged 2-4 degrees when kneeling, while lumbar flexion averaged 16-20 degrees. Stooping tasks resulted in the highest lumbopelvic flexion ($p < 0.001$). Overall flexion averaged 60 degrees when stooping under a 1.2 meter ceiling, and averaged 45 degrees under a 1.5 meter ceiling. The pelvic contribution to flexion in stooping tasks averaged 12-16 degrees, the balance resulting from lumbar flexion. Standing lifts resulted in lumbopelvic flexion that averaged slightly lower than stooping tasks. Overall flexion during standing tasks ranged from 31-48 degrees, with approximately 75% due to lumbar flexion. Results of this study will be used to develop recommendations for lifting in restricted postures.

SHIFTWORK SCHEDULING AND INDIVIDUAL FACTORS ASSOCIATED WITH THE INCIDENCE OF INJURY/ILLNESS AT THE WORKPLACE

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Designing a better shift schedule may increase both workers' well-being and productivity. This study analyzed OSHA recordable injuries/illnesses during the period 1994 to 1997 from a fiberglass manufacturing plant to examine the association of shiftwork scheduling and individual factors with the incidence of injury/illness. Five schedule variables (type of shift, length of workday, number of consecutive workdays, variation of weekdays for days-on and days-off, and number of rotating shifts) and three individual variables (age, gender, and seniority) were considered. Also a dichotomous incident classification scheme (ergonomics- and safety-related cases) was established. Using logistic regression, seniority was revealed as a significant determinant in schedule assignment. Injury/illness statistics demonstrated ergonomics-related incidents produced more severe effects (2.5 times) than safety-related incidents, while their incidence rates were about the same. In addition, logistic regression analysis found: (1) females and workers with less than 20 years of seniority had an increased risk of injury/illness, (2) rotational schedules increased the risk of safety-related incidents among females (odds ratio (OR) = 2.2), and (3) extended (56 hour) work-period schedules increased the risk of ergonomics-related incidents (OR = 1.6). The effects of rotating schedules and extended work-period schedules could have resulted from reduced attention and increased biomechanical stress to the body, respectively.