was investigated using a within-subject repeated measures ANOVA on specific gait parameters within each ramp angle condition, with the independent variable being load level. Statistically significant increases in the normal forces (partly due to the load's weight) and rate of normal loading (higher angular foot velocity, earlier peak of normal force) were associated with load carrying, which interestingly did not affect shear forces. This, in turn, resulted in small but significant decreases in the peak RCOF. More controlled heel contact dynamics (slower heel velocity) were observed when carrying a load. Finally, all of these changes along with postural modifications led to decreases in the joint moments, particularly at the hip. For most of these variables, there were no significant differences between the 2.3 and 6.8 kg load conditions. These results suggest that people adapt their gait when carrying loads to reduce slip and fall potentials.

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F1.4 Method of Expressing Slipperiness in Gait—Noguchi T

To prevent the slips accident which happens frequently in winter, the method of expressing slipperiness in gait is introduced.

First of all, the three component of ground reaction force in gait is measured by force plate. Next, a ratio of horizontal component to perpendicular component of ground reaction force is calculated. The ratio is called Magnitude of Tangential Force Ratio (S). The tangent of fore and after component and right and left component of ground reaction force indicates the Direction of Tangential Force.

The center of pressure is assumed to be origin, and Magnitude of Tangential Force Ratio and Direction of Tangential Force are represented in polar coordinate system. The locus in the vector is drawn according to the passage of gait time. This figure is called Vector Locus. A circle of the same radius as the coefficient of friction (m) of the road is drawn in this Vector Locus repeatedly.

The pedestrian begins to slip when the Vector Locus is corresponding to this circumference. Additionally, slips are assumed for the period from which the Vector Locus has come out to the outside of the circle. Therefore, slipperiness and the direction of slips can be intuitively distinguished by this figure. Moreover, the value defined in the ratio of time that Vector Locus comes out outside of this circle [T(S>m)] and the time between stance phases (Tall) is called Danger Coefficient of Slip (DCS). DCS can be shown by the following expression.

$$DCS = T(S>m) / Tall \quad (1)$$

By expressing slipperiness by using these Vector Locus and DCS, an objective diagnosis and guidance concerning slips in gait become possible. For example, when the coefficient of friction of the road is assumed to be 0.1, DCS has been improved from 60% to 20% by slowly walking on the right foot.

Session: F2.0
Title: Workplace Violence Research: Past, Present and Future
Category: Special Session
Organized by Lynn Jenkins, National Institute for Occupational Safety and Health
Moderator(s): Lynn Jenkins

F2.1 History and Status of NIOSH Research on Workplace Violence—Jenkins EL

NIOSH has been conducting research on workplace violence since 1988. A number of studies have been published, focusing first on workplace homicide and then expanding to include nonfatal workplace assault. NIOSH has focused on improving surveillance data, integrating information from multiple sources, and identifying risk factors and prevention strategies. A hallmark of these activities has been outreach and collaboration-bringing together government and academic researchers in both public health and criminal justice, along with labor, industry, human resources, legal, and employee assistance professionals.

Violence is indeed a substantial contributor to death and injury on the job. Homicide has become the second leading cause of occupational injury death overall and is the leading cause of occupational injury death for women. Estimates of nonfatal workplace assault vary depending on the data source, but data from the National Crime Victimization Survey indicate that each year from 1992-1996, more than 2 million workers were victims of a violent crime while working or on duty.

Risk factors for workplace violence include dealing with the public, the exchange of money, and the delivery of services or goods. Prevention strategies for minimizing the risk of workplace violence include (but are not limited to) cash-handling policies, physical separation of workers from customers/clients, good lighting, security devices, escort services, and employee training. A workplace violence prevention program should include a system for documenting incidents, procedures to be taken in the event of incidents, and open communication between employers and workers. Because no single prevention strategy is appropriate for all workplaces, workplace violence prevention efforts should be tailored to the risks in particular workplaces. NIOSH, along with others in the occupational safety and health community, is beginning to evaluate the effectiveness of various strategies in high-risk settings, so that intervention efforts can be most effectively targeted.

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ABSTRACTS

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