

# THE INFLUENCE OF INDIVIDUAL FACTORS ON THE ABSORPTION OF VIBRATION ENERGY IN THE HAND AND ARM

L. Burström

National Institute for Working Life, Division of Technical Industrial Hygiene, Umeå, Sweden

## SUMMARY

The detrimental effects of vibrating hand-held tools upon humans have been known for a long time, and determination of the absorption of vibration energy into the operator's hand and arm could be an alternative method of risk assessment.

The energy absorption in the hand and arm during exposure to random vibration has been measured in 84 subjects, 40 males and 44 females. A special handle was used during the measurements. The influence of various experimental conditions, such as vibration level ( $3-12 \text{ m/s}^2$ ), vibration direction ( $X_h$ ,  $Y_h$ ,  $Z_h$ ), and grip force (25-75 N) were studied. Furthermore, the influence on the absorption of different individual biological factors, such as age, weight, height, hand and arm dimensions as well as blood pressure were also investigated. The subject also provided demographic data through a questionnaire covering work, symptoms of finger blanching and numbness as well as current use of nicotine (snuff or tobacco).

The results show that energy absorption is influenced by exposure directions and levels as well as grip forces. Furthermore, the results show that individual biological differences between subjects, for instance age, hand volume and hand thickness, have a significant influence on the amount of absorbed energy. Blood pressure had no influence on the absorption. The same was also found for the subjective reported symptoms of finger blanching or numbness as well as for use of nicotine.

*Key words:* energy absorption, hand-transmitted, biological factors, vibration

Address for correspondence: L. Burström, National Institute for Working Life, P. O. Box 7654, S-907 13 Umeå, Sweden