may become problematic. Spinal compression tissue tolerance decreases with age (Jager et al. 1991). Also, Gaudart (2000) found that, in the French automobile industry, older workers performed less job rotation. Ageing operators ‘posted out of’, or avoided work situations that were damaging to their health, and/or did not allow their organizational skills and strategies to be utilized successfully. Technological and organizational changes which increase task complexity, such as job rotation, may occur at the same time as the abilities of the workforce are decreasing. This combination of factors may require careful consideration for implementing job rotation in future work design.

Ideally, risk of injury should be reduced to zero. However, it would be appear that risk of low back pain is present even in sedentary jobs (Videman et al. 1990). The LBPR approach presented in this paper would appear to identify some of this risk for it estimates that a 50th percentile male who simply stands all day long would have a combined LBPRI score of 0.13. In designing work, and work schedules, the effects of both peak and cumulative loading need to be considered. As an administrative control, job rotation may not be as effective at reducing biomechanical injury risk factors as expected. This emphasizes the importance of engineering controls because they help to diminish the exposure in the system and therefore provide a benefit to all workers required to perform that job. Reducing high peak forces, or heavy work, is important. However, designing the heavy work out of jobs, although necessary, is not sufficient to reduce risk. High levels of cumulative forces can arise from performing many repetitions of work and/or working for prolonged durations with low levels of peak forces and these latter situations must not be overlooked. By reducing high forces that are repeated or prolonged, a beneficial effect is produced in reducing both peak and cumulative risk factors.

The results of this study are especially important given the popularity of citing job rotations as a risk reduction mechanism (Jonsson 1988, Vander Doelen and Barsky 1990, Hazard et al. 1992, Wands and Yassi 1993, Grant et al. 1997, Kuijer et al. 1999). Although many advantages have been attributed to job rotation (Triggs and King 2000), its effects on injury risk should be carefully examined when determining whether job rotation is to be implemented. However, in the absence of clear exposure standards or limits, it is difficult to know how effective a strategy job rotation may be (Stoffman and Sykes 1999).

Finally, although only an example, this paper demonstrates that rotation may not reduce injury risk as much as expected and that it may increase the risk for some. The authors suggest that this finding may be applicable in other jobs and rotation schemes used in industry. Further research is still needed on the effects of job rotation/enlargement on exposure health effects and performance.

5. Conclusions

The use of the time weighted average approach (TWA) for estimating the effects of job rotation on the probability of reporting low back pain may not be appropriate with scores that involve both peak and cumulative risk factors.

As soon as a worker in a low demand job rotates into a high demand job, a step increase occurs in the probability of reporting low back pain because of the immediate exposure to the peak loading parameters associated with the more demanding job.