

# An electrogoniometric study of trunk movements during lifting activities

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## **Abstract**

The aim of this study was to compare movements of the trunk during simulated lifting activities. A portable electrogoniometer was used for measuring the flexion and extension movements of nineteen female industrial workers (ten symptomatic and nine asymptomatic) during lifting from two heights:  $H_1=45$  cm and  $H_2=75$  cm. The results showed that the symptomatic group presented a greater range of movement than the asymptomatic group. There were significant differences in the ranges of movement between the groups of subject, for lifting from 45cm.

## **Introduction**

Low back pain affects millions of people annually around the world, with a high incidence being work-related. There is a clear relationship between back disorders and physical load imposed by manual material handling (Nussbaum et al., 2000). The main determinant or aggravating factor related to these disorders is manual material handling, which involves lifting and carrying tasks (Straker, 1999). It has been recognised that the biomechanical factors in these tasks are actions of extreme trunk flexion and force. The most affected region of the spine is the lumbar region (low back). Besides the weight of the load, this region also has to bear the weight of the trunk itself, when it is in non-neutral positions. The more the trunk moves forward, increasing its anterior flexion, the greater the overload. Jäger and Luttmann (1989) reported that high levels of intervertebral disc compression are reached at extreme amplitudes.

It has been recognised that low back disorders are a multifactor event. Despite this, epidemiological reviews have already reported scientific evidence that these disorders are associated with awkward postures and lifting activities (Bernard et al, 1997).

In this context, the reallocation of the injured workers after sick leave due to low back disorders imposes a challenge on the industries. Thus, studies analysing the motor behaviour of these workers during risky activities are needed, to provide guidelines for the ergonomic improvement of their jobs.

In D. de Waard, K.A. Brookhuis, S.M. Sommer, and W.B. Verwey (2003), *Human Factors in the Age of Virtual Reality* (pp. 281 - 284). Maastricht, the Netherlands: Shaker Publishing.