

Figure 1: During bending forward, the centre of gravity of the trunk moves forward relative to the lumbar spine. Therefore the moment arm (A) increases. Assume A to be 2 cms during standing and 22 cms during bending. The weight of the upper body is estimated to be 450 N. The forward bending moment resulting from the posture of the trunk is 9 Nm in upright standing (1) and 99 Nm during bending (2). To this trunk moment has to be added the moment created by the weight of the box (say, 100 N) and its moment arm B (18 cms when standing upright and 31 cms during bending). The moment attributable to the external load changes only slightly, from 18 Nm (1) to 31 Nm (2).

that the object fits between the legs. If the object is too large to be brought between the legs, then the squat-lifting method is actually more stressful than the stoop-lifting method.

Back pain and occupation

Complex forces act on the lumbar disc during rotational movements and lifting weights while in the stooping position, and the difficulties of measuring the real pressure when someone is doing heavy manual work are very considerable. Radiological films are of little help.

Chaffin & Co. used a technique for calculating lifting strength ratios. They have shown that to lift weights in many instances amongst theatre workers which makes maximum use of lifting strength. The importance of load bearing on the weight bearing

With the Dutch outlawing the use of counterweights in their theatres, a theatre consultant describes the lengths to which it is necessary to go to minimise the risk of back injury, and a spinal surgeon gives a detailed view on the factors that can cause damage to our bodies when carrying out typical theatre tasks. The approach now being taken in the Netherlands is also described and much discussion follows.

Occupational trauma

Various painful conditions of the back have been associated with particular activities. However, others can result from over-indulgence in hobbies or sports after prolonged periods of inactivity. It is easy to postulate that prolonged heavy manual work may encourage the development of degenerative changes in the discs and the joints. However, while some of these are the process of ageing, there are other predisposing factors like genetics. It has been shown, however, that berry pickers who stoop have significantly more back pain than those such as aubergine pickers who stand. Sitting and driving have also been shown to cause, and to increase, instances of back pain amongst workers.

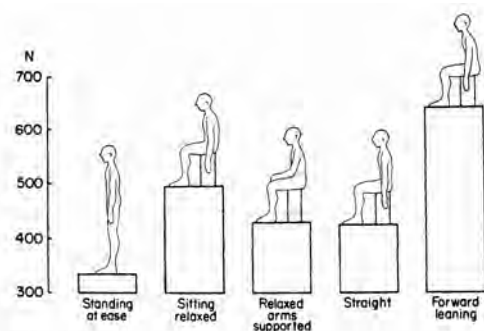


Figure 2: The load on the L3 disc in unsupported sitting is higher than the load during standing.

From bottom left: Figure 3: Intra-abdominal pressure supports the extensor mechanism, Figure 4: Lifting a box which will not fit between the knees; the bent-knee method (B) produces a greater moment than the bent-back method (A) because of the longer moment arm, and Figure 5: limits on lifting.

