Low Back Pain

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Concord Sport & Spine Physiotherapy

LBP in Construction Workers – Lifting Technique

This is another excerpt from my research paper on Low Back Pain in Construction Workers. You may find some of these facts interesting.

The literature on the 'correct' lifting technique is controversial [8,12,53,65]. The advice of 'bend the knees and keep the back straight to lift' has been endorsed for at least 70 years [24,35]. In a recent study, 80% to 90% of experts in health and physical fitness promoted this advice, even though most had reservations about doing so [108]. What is interesting is that Davis et al questioned this advice 50 years ago[35], yet it is still the most common recommendation for lifting. Figure 1 shows a typical diagrammatic representation of this lift as recommended in industry[6]. This is known as the 'squat' or 'knee' lift, as opposed to the 'stoop' or 'back' lift where the knees are straight and the back bends. The advice on squat lifting is often provided with the disclaimer that this technique may only be effective with small, light loads [40]. However this advice has been found to be questionable for the vast majority of lifting situations. This is for the following reasons:

- Investigations have found that a very small percentage of lifts can be performed this way [8,9,31,37,56,79,107,108,121].
- Clinical observation and research evidence shows that people bend their backs as much, or sometimes more, when squatting to lift [26,37,38,56,72,82]. In Figure 2, the image on the left shows how excessive lower back bending can occur with squat lifting [82].
- Squat lifting from the ground was found to be impossible without substantial low back bending [38].
- Injury risks were similar for squat compared to stoop lifting [26].

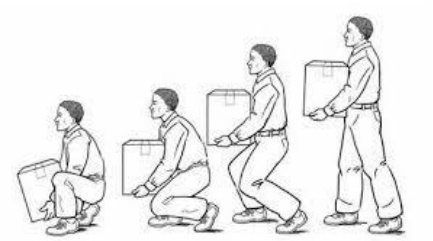

Fig 1: The squat-lift. From. From *Simple Solutions – Ergonomics for Construction Workers* [6]

- Both expert and novice lifters converted from a squat to more upright lifting style with repeated lifting, or when weights became heavier [24,31,35,60,105,107,121].
- The quadriceps do not have the strength or endurance capacity to perform repeated squat lifts [35,53,107].
- Squat lifting results in the subject consuming more oxygen, and is reported as

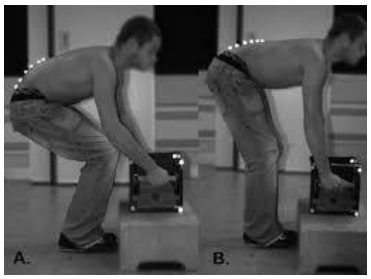

Fig. 2. From *Mawston & Boocock*

significantly more tiring [8,9,53,60,115,121].

- The long-leverage and mechanical advantage afforded by using the hip and thigh muscles is significantly lost when the hips drop below the knees [60].
- The lift is more likely to be off-balance, and require the load to be further away from the lifter's centre of gravity with squat lifting [9,37,53]. This can increase lower back compressive forces by up to 50% [31].
- The squat lift was found to be a difficult technique to teach [115].

While most research on lifting style has focused on squat as opposed to stoop lifting, many experts are more likely to advocate the 'freestyle' or 'semi-squat' lifting method (Fig 2B). This is a combination of the two techniques described above. (See Sedgwick & Gormley, 1998 for an illustration comparing the three lifting styles [108]). If performed correctly, a semi-squat lift should ensure that neither the back nor knees bend excessively. It has the following advantages:

- It employs the much larger and more powerful hip and posterior thigh muscles [15,118].
- Unlike squat lifting, the semi-squat technique is said to be easy to teach [108].
- The centre of mass of the body is already raised, so has less distance to travel [53,107].
- When instructed to use the technique most comfortable, workers invariably choose the semi-squat lift [8,31,35,107]. In particular, elite weightlifters use this way of lifting [1,8,71].
- Older and more experienced workers were found to lift this way [9,16,24,43,44].

In reality, the lifting style adopted will depend on many factors that will vary between each situation and individual [12,15,44]. It may be unrealistic to teach a specific 'technique' [44,108], although in one study training of the semi-squat lift was found to assist safe performance of other strenuous activities [108]. Regardless, experts in health and movement should consider incorporating aspects of the following into workplace training interventions: body awareness, movement skill acquisition [44], efficient use of the feet [9,43] and hips [71], correct shoulder positioning relative to the ground [43], training muscle and nervous system 'preparedness' for sudden or unexpected loads [83], and the appropriate use of asymmetrical positions [31,44]. Proficient use of body weight [71], leverage [44] and directing forces through the centre of gravity of the body [71], are aspects displayed by expert compared to novice workers [67]. What may be more important than the actual lift style, is attention to the posture adopted by the low back [8,28,71,82], the distance of the load from the body [15], and efficient use of the rest of the body, particularly the legs [44].

For a full reference list, see the article 'Low Back Pain in Construction Workers':
http://www.cssphysio.com.au/pdfs/Low-Back-Pain-in-Construction-Workers-Researchgate-copy.pdf

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