



Pregnant Women Face Unique Ergonomic Risk Factors

Taylor Greenfield, OHCOW Windsor Ergonomist

“So, when are you due?”

“I’m ready for a little labour everyday” jokes Dale, as he pats his portly midriff. And in response to the groans, he adds “That’s why they call me a ‘General *Labourer*’, right?”

“Dale’s got a while to go before he *loses it*’, but I’m due in two weeks” says Dawn.

“Two weeks and you’re still working?”

“Sure,” Dawn asserts. “If I can keep my sense of humour through this back pain, sleep deprivation, and Dale’s wannabe pregnant jokes, then why not?”

More and more, Dawn’s ambitious work agenda is becoming the norm for pregnant women across North America. Many women will work right up until the very last possible day. While working during a woman’s first trimester may pose the greatest risk to her fetus, continuing to work late into pregnancy poses higher risks to the mother due to a vast combination of physiological changes and resulting ergonomic risk factors.

Shift work / Long shifts

During the course of her pregnancy, a woman will experience a variety of physical changes that decrease her ability to adapt to the effects of shift work or long shifts. For example, a pregnant woman has increased levels of hormone production. Relaxin and progesterone are two hormones that help to relax the soft tissues (muscles, ligaments, and connective tissue) to create room for the birthing process. However, some of these hormones may also be linked to circulatory or digestion disruption. Similarly, the increase in hormone production can add to an impaired ability to deal with mental stresses on the job such as monotonous work or machine paced production. For the safety of both the mother’s health and the growth of her baby, repetitive or entirely manual duties (even rotation from one manual duty to another), lackluster tasks, or line work should be eliminated during pregnancy. Also, with the combination of circulatory and hormonal changes that occur, pregnant women experience increase rates of carpal tunnel syndrome, varicose veins, and peripheral swelling. Although these effects on the mother are usually temporary, fatigue and shift work have also been correlated with preterm births and miscarriages for pregnant workers.

Physical Work/ Balance

With her continuous growth and her ever-changing centre of mass, a pregnant woman is more likely to lose her balance when standing, especially when working at heights (platform, ladder, step stool) or tip when reaching for high or distant objects. Similarly, the horizontal reach component of a lift will increase as a pregnant woman approaches 40 weeks. Her familiar lifting mechanics become impossible. As such, objects feel heavier



because her arms are outstretched. The resulting shear forces acting on the lumbar tissues have dramatically increased even if the amount of weight she is handling has not changed—she has! The usual core muscle functioning is compromised as the abdominal muscles may separate to accommodate the baby's growth while the continuous activation of the back extensors set the stage for muscle fatigue and subsequent tissue failure. Lifting heavy objects becomes progressively more awkward and risky as the tissues are under new biomechanical restraints. Any forceful or strenuous lifting demands may challenge the tissues beyond their tolerance, resulting in a strained muscle or sprained ligament. Similarly, the increased abdominal pressure that occurs during pregnancy may also pose a risk to the developing fetus during any sort of strenuous lift.

Unadjustable Workstations

The risk of developing back, shoulder and neck pain is often increased during pregnancy because of altered awkward postures that are demanded from unadjustable workstations. As the pregnancy progresses, a worker will maneuver and place things at a distance from her midline in order to keep objects in view. As such, she will increase the amount of shoulder and trunk flexion used to accomplish tasks when seated. Many women will develop sciatic pain from increased muscle tension around the sciatic nerve and/or greater forces on the "sitting" bones of the pelvis. Not only can sciatic pain create problems for finding a comfortable position to sit, stand or lay down, but this inability to find relief can add to the effects of fatigue, muscle tension, and circulation disturbances.

The resulting aches and pains of pregnancy not only increase reported sick leave, but can also increase the risk of premature delivery. While some guidelines recommend lowering working heights by 2-7 cm, self-selected heights in another study suggests lowering height even further. The use of footrests help to reduce the load on the low back by varying postures and transferring the load from both legs to alternating legs while minimizing inward back arching with the increased belly size. Ideally, the workstation should allow for alternating sitting and standing postures, while minimizing reaches. Studies have found that strenuous working postures (including reaches in excess of 16") are associated with premature labour and even pregnancy loss.

Prolonged Sitting / Standing

While prolonged sitting is hazardous for all, driving poses greater risks for pregnant women and their babies because of the additional influences of altered blood flow, static postures and the exposure to whole-body vibration (from car seat and steering wheel). In addition, research has shown a connection to premature delivery with tasks involving prolonged standing. Authors suggest that duties requiring sitting or driving should be alternated with standing or moving duties in 1 or 2 hour increments. Standing or sitting for extended periods only adds to the probability for development of many injuries, especially during the end-phases of pregnancy. Overall, employers should be aware that pregnant workers may need to take short but frequent breaks to allow their bodies to recover from the increased demands of pregnancy.



Environmental Factors

Outdoor, factory, or kitchen workers should be aware of both their increased resting heart rate and energy consumption when pregnant. The inappropriate fit of personal protective equipment (PPE) may restrict expecting workers from performing duties safely. Employers must supply properly fitting PPE for all workers. They should also have a plan to protect workers from heat stress that can result from excessive physical work in hot and humid climates, particularly when pregnant.

Vibration / Noise

When combined with shifts longer than eight hours, prolonged standing work, or exposure to vibration, research has found that expecting mothers exposed to noise levels greater than 90 dB-a have babies of low birth weight. As its own ergonomic risk factor, vibration further increases the risk of permanent ligament damage since the hormonal changes in a pregnant woman have already increased her joint laxity. Anti-vibration floor matting or handle insulation can help to reduce the effects of vibration when working near heavy machinery, on vibrating platforms, or with powered hand tools.

Electromagnetic fields (EMF's)

Electromagnetic fields (EMF's) come from machines that are powered by an electrical source. They are not visible to the naked eye and can be present even when equipment is turned off. While it is known that high voltage EMFs and rooms with multiple visual display terminals (monitors) have been linked with various cancers, their effect on maternal and fetal health is inconclusive. Research suggests that new monitors with very low frequencies (VLF's) and extremely low frequencies (ELF's) are not likely to cause miscarriages or birth defects. As a precaution however, women should limit their exposure to EMFs and prolonged monitor use.

Obviously, there is much more to being pregnant than just the increased girth. Pregnant workers are not the same as their 'jolly' co-workers and for many reasons should not be treated as such. Studies have shown that low birth weight, preterm labour, and premature births can lead to developing health problems such as learning disabilities and heart or lung problems as children develop. Research clearly shows a link between psychological stressors and the onset of physical illness and disease and pregnant women are more sensitive to the effects of mental stressors in the workplace. Employers should be aware that a few simple prevention measures can improve both the physical and mental well being of this special component of their workforce.

For further information or for the specific articles relating to ergonomics and pregnancy that were used in this commentary, please contact tgreenfield@ohcow.on.ca.