Use of Exercise Balls as Workstation Chairs is Not Recommended by Mayo Clinic in Rochester  
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Introduction:  
Do you spend 8 or more hours sitting at your desk glued to your computer monitor? Do work and other commitments prevent you from exercising or exercising as much as you would like? If so, you are not unlike the majority, or 78%, of the American workforce (Day Timer Inc.). Wouldn’t it be great if exercise sessions could be completed while working?  

According to the Mayo clinic, core exercises are an important part of any fitness program. Developing core strength or stability involves the muscles of the pelvis, lower back, hips and abdomen working in harmony. One piece of equipment used in developing core strength is the exercise ball.  

The Swiss Ball or exercise/stability ball was invented in Italy in 1963 as a toy. By the 1980s, the ball had found its way into North American physical therapy settings. A decade later, the exercise ball was used to develop core strength in the fitness industry. The exercise ball has also been suggested as a substitute for an ergonomically designed office chair at the computer workstation. This practice is not recommended for a number of reasons. Below is a brief overview.  

Review of Current Literature  
Exercise balls have been increasingly used in fitness and rehabilitation programs as an exercise tool (Merritt & Merritt, 2007). Their usage has focused on stabilization exercises, which is a term given to any exercise that “challenges the stability of the spine while training patterns of muscle activity and spine posture to ensure sufficient stabilization” (McGill, 2002). In other words, exercise balls can result in increased muscle activity that will subsequently increase core stability and strength, which is thought to be beneficial in reducing the incident of low back pain (Gregory, Dunk & Callaghan, 2006). Some have suggested that dynamic or active sitting with frequent posture change is beneficial and have recommended sitting on the exercise ball. It is important to recognize that these studies have been conducted under the supervision of therapists and exercise specialists, whereas this would not be the case if the exerciser balls were used as office furniture.  

To date, little quantitative evidence supports the practice of exercise balls as an alternative to standard office chairs for prolonged sitting at computer workstations. Anecdotal evidence in a case study of two individuals with lower back pain suggested that “active sitting” obtained from using the exercise ball may be helpful in alleviating lower back pain in some patients (Merritt & Merritt, 2007). Several more quantitative studies comparing sitting on an exercise ball and standard office chair found that no significant differences existed in the magnitudes of muscle activity, spine posture, spine loads and overall spine stability (Kavcic, Grener & McGill, 2004; Gregory et al., 2006; McGill, Kavcic & Harvey, 2006; Jackson et al., 2013). In other words, these studies failed to find any beneficial changes in spine stability or compression while sitting on a ball. A more recent study indicated that there was no evidence to support the notion that a
stability ball chair would improve trunk strength or lumbar spine posture or the frequency of lumbar spine movements during a two hour sitting task (Jackson et al., 2013). The data indicated that similar lumbar flexion was exhibited in chair and exercise ball sitting although there was significantly greater posterior pelvic tilt while sitting in an office chair (Gregory et al., 2006). It was suggested that the increased hip flexion while sitting on an exercise ball may result in an imbalance between the hip flexor and extensor muscles which may adversely affect sitting comfort (Gregory et al., 2006).

Kingma and van Dieen (2009) found that sitting on an exercise ball resulted in 33% more trunk motion than sitting on an office chair. However there was no significant difference in lumbar motion between the two sitting surfaces, which questions the notion that exercise balls are beneficial because they promote dynamic motion of the lower spine (Kingma & van Dieen, 2009). In addition, the higher muscle forces on the spine resulted in increased fluid loss from the intervertebral discs, which resulted in significantly greater spinal shrinkage over 1 hour typing while sitting on a ball rather than in a chair (Kingma & van Dieen, 2009).

It was found that sitting on a ball appears to increase the seat-user interface, which increases the contact area and provides a more uniform contact area between the user and the ball, which can result in uncomfortable soft-tissue compression (McGill et al., 2006; Gregory et al., 2006). It was speculated that the uniform pressure distribution transfers the pressure from the higher pressure threshold areas of the ischial tuberosities to the soft tissues in the gluteal area and hamstring muscles (Gregory et al., 2006; McGill, Kavcic & Harvey, 2006). It was also observed that when test subjects performed office tasks, they found sitting on the balls less comfortable over time than an office chair (Gregory et al., 2006; Jackson et al., 2013; Kingma & van Dieen, 2009). Subjective discomfort ratings by the study participants indicated significantly greater lower and upper back discomfort as well as overall whole body discomfort while sitting on a ball (Gregory et al., 2006; Kingma & van Dieen, 2009). The back rest in the office chair was found to reduce the contact area on the seat pan (McGill, Kavcic & Harvey, 2006). The preceding data suggests that use of the exercise ball for prolonged sitting may not be advantageous and suggest that potential safety issues may be associated with sitting on an unstable surface like the exercise ball.

Claims that active sitting will have a greater impact on energy expenditure have also not been supported. Lumbar muscle activity was found to be 66% higher while sitting on the ball although the overall activation levels were a very low percentage of the lumbar muscle’s maximum voluntary contraction. Muscle activation levels of the rectus abdominus, and external/internal obliques have ranged between 1% - 2.8% of the maximum voluntary contraction (Gregory et al., 2006; McGill, Kavcic & Harvey, 2006). While those for the erector spinae and trapezius muscles have ranged between 1.3% - 4.8% (Kingma & van Dieen, 2009; McGill, Kavcic & Harvey, 2006). It was suggested that the low levels of muscle activity were related to increased muscle fatigue while sitting on the ball (Kingma & van Dieen, 2009). Measures of actual energy expenditure have shown very little difference while sitting in an office chair, on a stability ball or even standing (Tudor-Locke et al., 2014). These data suggest that there is little impact on reducing body weight using these workstation alternatives relative to a standard office chair. Beers et al., (2008) suggested that the energy expenditure difference between sitting in an office chair, on a stability ball and standing was no more than 4.1 kcal/hr,
which is only 32 kcal/day. Tudor-Locke et al. (2014) indicated that it would take 100 full-time working days sitting on an exercise ball or standing to reduce body fat by one pound.

In summary, it appears that sitting posture on a stability ball is similar to sitting in an office chair (Gregory et al., 2006). Data suggests that the acceptability of workstation alternatives in terms of preference for performing word processing tasks for a 20 minute duration of time favored seated office chairs over use of exercise balls and standing (Beers et al., 2008). The preceding research suggests that exercise balls are not a good substitute for chairs for computer workstation usage. Exercise ball may best be left for exercising.

References:


