

Bike modifications to prevent low back pain

By Dr. Jeremy Law (CMCC, Class of 2014)



A study looking at prevalence of injury among professional, elite level road cyclists found that 58 per cent of 109 surveyed had an episode of low back pain in previous 12 months (23 per cent reported episode of knee pain). Knee pain was the most likely to cause loss of time on the bike (57 per cent of the 23 time loss injuries reported), while 41 per cent of cyclists with low back pain sought medical attention (Clarsen, 2010).

Cycling offers a low impact option to running or walking for cardiovascular health benefits, muscle strength, and outdoor enjoyment. But if cycling is associated (during or after a ride) with physical pain, it is likely that the activity would be avoided.

Biking is likely not the best form of exercise for someone where a reclining position is comfortable and relieving of any low back symptoms (example, degenerative disc disease, acute disc herniation), but encouraged and a welcome form of exercise for someone that finds a forward and flexed position relieving or even comfortable when compared to standing upright (example lumbar spinal stenosis)

The style of bike ridden by an individual can drastically impact the strain and pain associated with riding a bike. A mountain bike or city hybrid bike will have handle bars that promote a relatively upright torso riding position which can relieve forward flex, stress and strain on the lumbar spine. A road bike that is fit aggressively for aerodynamics (handle bar positioned well below the height of the seat) can cause or aggravate lumbar spine pain if the cyclist does not address core strength and conditioning off of the bike. A triathlon or time-trial bike, specifically designed with aerodynamics and static posture in mind, requires significant core strengthening cross training to maintain low, flexed positions for long periods of time without pain or discomfort

A criticism and challenge of cycling is that the activity does not use much core and spinal musculature. If a cyclist is experiencing back pain, there are quite a few things they can do to reduce, relieve, or completely resolve the symptoms:

Address bike choice: If the bike is being used for daily commuting, or casual and short weekend rides, aerodynamics and speed is likely not the most important thing. A bike with handlebars that are near the same level of the seat can reduce flexion and strain on the lower back, and allow for a more comfortable ride. In addition to this, biking safety and enjoyment may be increased since the cyclist will be more upright and will have a wider field of vision.

A cyclist in this position may also breathe easier since the chest and thorax will be more 'open' and less compressed against the lumbar spine, which may inhibit the full expansion of the lungs and function of the muscular diaphragm.

VanHoof (2012) found that cyclists with chronic non-specific low back pain showed significantly more lumbar flexion during two hours of cycling compared to age and gender matched asymptomatic controls, supporting the above concept. Supporting this, Burnett found that cyclists with back pain showed the same increased lower lumbar flexion but with rotation and with an associated loss of co-contraction of the lower lumbar multifidus (a key stabiliser of the lumbar spine).

Providing core and lumbar strength and flexibility exercise could be incorporated in to every cyclists daily routine.

Assess saddle angle: Conversely, Salai (1999) found that there was a tendency towards hyperextension of the pelvic – spine angle that created an increase in tensile forces at the promontorium. They suggest that creating an anterior inclining angle to the saddle. The inclined saddle theory was applied to a group of community cyclists with low back pain and >70 per cent reported major improvement in the incidence and magnitude of the back pain complaint.

Assess saddle type: Not only can saddle design improve comfort for enjoying long bike rides, Bressel suggests that saddle type can also effect pelvic and trunk angle. They looked at saddles with anterior-medial cutouts and 20 female cyclists on a stationary bike using three different saddle types: standard, partial cutout, and complete cutout designs. Pelvic angle was measured using an inclinometer and trunk angle was measured from digitization of video images. Comfort level was subjectively ranked from most to least comfortable. Partial and complete cutout saddles created anterior pelvic tilt angles 8 per cent and 16 per cent greater than for the standard saddle, while trunk flexion was greatest for the complete cutout saddle.

A 77 per cent greater anterior pelvic tilt angle and 11 per cent greater trunk flexion angle was seen in the lower 'drop' vs. 'top' handlebar positions. Regarding comfort, 55 per cent ranked the partial cutout saddle the most comfortable, and 30% ranked the standard saddle as the most comfortable.

If fatigue and core strength do play a role in back pain with cyclists, a safe and conservative approach to reducing symptoms and increasing pain free cycling time could be the inclusion of core and spine strengthening exercises during the season and offseason for cycling.

A comfortable and sustainable bike position can be a challenge to obtain, especially when someone is beginning cycling or returning to cycling after a period (or winter season) away.

Burke (1994) suggests that, after a proper fit, minor aches and pains are normal as the body adjusts to the new riding posture. He also suggests that the underlying principle of positioning a cyclist on a bicycle is to remember that the bicycle is adjustable, and the cyclist is adaptable.

Jeremy Law

Has been an avid cyclist and triathlon enthusiast for 10 years, was a finisher in 10:28 Ironman Mont Tremblant, has participated in and finished 10 marathons and is also an ultra marathoner. In addition to cycling and running, Jeremy was an alpine ski racing coach for over 10 years in Nova Scotia. In what little spare time he has, he is a part-time sales associate at Endurop Sport Toronto triathlon and bike shop.