

## Avoiding the back-to-school backache

**Background and epidemiology:** Back pain in children appears to be more common than was previously thought. Studies have indicated that 10%–30% of healthy children experience back pain, especially low-back pain, by their teenage years.<sup>1,2</sup> About 2% of these children experience symptoms severe enough to prompt a visit to the doctor.<sup>3</sup> Most simply trudge through the mild pain with little complaint or disability.

Recently, attention for the many possible reasons for back pain in children has focused on the daily load of the backpack ([www.wrcmedia.com/news/106.asp](http://www.wrcmedia.com/news/106.asp)), and this focus has triggered studies in a number of countries.

In a recent survey of 237 Italian children in their sixth year of school and with an average age of 11.7 years, 94.5% of them carried a backpack to school and 37.3% carried it for more than 15 minutes each school day.<sup>4</sup> The average load was 22% of individual body weight, and one-third of the children carried loads of more than 30% of their body weight at least once a week.<sup>5</sup> The point prevalence of self-reported back pain was 15.6% and the lifetime prevalence by sixth year was 47.7%. When asked, 80% of the children felt their backpack was heavy at least “sometimes”; 65.7% reported that carrying a backpack made them tired and 46.1% felt that it caused them back pain. Children who reported “feeling fatigued” while carrying the backpack and those who carried the pack for longer periods of time experienced significantly more back pain. Backpack weight was not associated with back pain.

Other studies of children’s posture and contour of the spine have shown a clear association between backpack load and postural response.<sup>6,7</sup> Children, especially young children, assume a compensatory forward head posture under backpack loads greater than 10%–15% of their body weight. Further research is needed to relate these findings to back pain, but they suggest that loads

less than 10%–15% of body weight are required to maintain normal postural alignment.

In addition to musculoskeletal and postural problems, heavy loads on the spine also affect lung mechanics and volumes. Repeated spirometry readings in 43 primary school children under different backpack loads (ranging from no load to 30% of body weight) showed a significant decrease in lung volume for loads of 20% of body weight and higher.<sup>8</sup>

**Clinical management:** Because children rarely present to family physicians with complaints of back pain, when they do they likely require full investigation. Musculoskeletal strain is only one possibility on a long differential list that includes disorders that are traumatic or mechanical (e.g., spondylolysis, fracture, herniated disc), developmental (e.g., Scheuermann’s disease), infectious (e.g., diskitis) and neoplastic (e.g., leukemia, osteoblastoma). A careful history that notes the onset, chronicity, severity and location of the pain provides valuable clues, as does a careful spinal examination to assess posture, alignment and skin condition, and a thorough neurologic examination involving motor, sensory and reflex testing and gait evaluation. Plain radiographs, technetium-labelled bone scans, single photon emission CT scans and MRI scans may be indicated. A complete blood count with differential and an erythrocyte sedimentation rate are useful screening tests. Testing for rheumatoid factor and HLA-B27 may be helpful if a rheumatologic disorder is suspected.

**Prevention:** Although heavy backpacks are not clearly established as a cause of back pain in children, the evidence suggests that reducing the load to 10% of body weight maintains normal posture and lung function in children. Ways to reduce the load include using a properly sized backpack that is snug to the middle of the back and has padded,



Too big a load?

broad straps and a waistband to transfer some of the load from the spine to the pelvis and reducing the carrying time.

Other factors, such as ensuring that children have school lockers for their books and packaging a year’s curriculum into separate modules instead of a single text, may also help reduce the backpack load.

Erica Weir  
CMAJ

### References

1. Richards BS, McCarthy RE, Akbarnia BA. Back pain in childhood and adolescence. *AAOS Instructional Course Lectures* 1999;48:525-42.
2. King H. Disorders of the pediatric and adolescent spine. *Orthop Clin North Am* 1999;30:467-74.
3. Olsen TL, Anderson RL, Dearwater SR, Kriska AM, Cauley JA, Aaron DJ, et al. The epidemiology of low back pain in the adolescent population. *Am J Public Health* 1992;82:606-9.
4. Negrini S, Carabalona R. Backpacks on! Schoolchildren’s perceptions of load, associations with back pain and factors determining the load. *Spine* 2002;27:187-95.
5. Negrini S, Carabalona R, Sibilla P. Backpack as a daily load for schoolchildren. *Lancet* 1999;354:1974.
6. Grimmer K, Williams M, Gill T. The associations between adolescent head-on-neck posture, backpack weight and anthropometric features. *Spine* 1999;24:2262-7.
7. Chansirirukor W, Wilson D, Grimmer K, Dansie B. Effects of backpacks on students: measurement of cervical and shoulder posture. *Aust J Physiotherapy* 2001;47:110-6.
8. Lai JP, Jones AY. The effect of shoulder-girdle loading by a school bag on lung volumes in Chinese primary school children. *Early Hum Dev* 2001;62:79-86.