OBJECTIVE: To study the relationship between chronic neck pain, standing balance and suboccipital muscle atrophy. We hypothesize that patients with chronic neck pain have more somatic dysfunction in the cervical spine than control subjects without neck pain. We also hypothesize that patients with chronic neck pain and somatic dysfunction exhibit more atrophy of suboccipital muscles. Lastly, because suboccipital muscles have a high density of proprioceptors, we hypothesize that chronic pain patients exhibit a loss in standing balance. DESIGN: Randomized, controlled, partially blind study examining chronic neck pain patients and control subjects for differences in degree of upper cervical somatic dysfunction, standing balance and suboccipital muscle atrophy. SETTING: Subjects were recruited from a clinical practice at Michigan State University; controls were recruited from the faculty, staff and students. PARTICIPANTS: Seven chronic neck pain patients and seven asymptomatic control subjects. MAIN OUTCOME MEASURES: Palpation was used to diagnose somatic dysfunction in the upper cervical spine. Balance parameters were calculated using a force platform; muscle atrophy was judged with magnetic resonance images. RESULTS: Chronic neck pain patients had almost twice as many somatic dysfunctions as controls (p = .028). Force platform results showed a decrease in standing balance in patients compared with control subjects (p = .004). MRI showed that chronic neck pain subjects had marked atrophy of the rectus capitis posterior major and minor muscles, including fatty infiltration. CONCLUSIONS: This study suggests that there is a relationship between chronic pain, somatic dysfunction, muscle atrophy and standing balance. We hypothesize a cycle initiated by chronic somatic dysfunction, which may result in muscle atrophy, which can be further expected to reduce proprioceptive output from atrophied muscles. The lack of proprioceptive inhibition of nociceptors at the dorsal horn of the spinal cord would result in chronic pain and a loss of standing balance.