

**DIZZINESS AND UNSTEADINESS FOLLOWING WHIPLASH
INJURY:
CHARACTERISTIC FEATURES AND RELATIONSHIP WITH
CERVICAL JOINT POSITION ERROR**

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Julia Treleaven, Gwendolen Jull and Michele Sterling
From the Department of Physiotherapy, The University of Queensland, Brisbane,
Australia

FROM ABSTRACT:

Dizziness and/or unsteadiness are common symptoms of chronic whiplash-associated disorders.

This study aimed to report the characteristics of these symptoms and determine whether there was any relationship to cervical joint position error.

Joint position error, the accuracy to return to the natural head posture following extension and rotation, was measured in 102 subjects with persistent whiplash-associated disorder and 44 control subjects.

Whiplash subjects completed a neck pain index and answered questions about the characteristics of dizziness.

The results indicated that subjects with whiplash-associated disorders had significantly greater joint position errors than control subjects.

Within the whiplash group, those with dizziness had greater joint position errors than those without dizziness following rotation:
(rotation (R) 4.5 degrees vs 2.9 degrees; rotation (L) 3.9 degrees vs 2.8 degrees respectively) and a higher neck pain index (55.3% vs 43.1%).

Characteristics of the dizziness were consistent for those reported for a cervical cause but no characteristics could predict the magnitude of joint position error.

Cervical mechanoreceptor dysfunction is a likely cause of dizziness in whiplash-associated disorder. **[WOW, VERY IMPORTANT]**

THESE AUTHORS ALSO NOTE:

It is estimated that between 12% and 40% of whiplash injured patients will develop persistent problems.

"After pain, dizziness and unsteadiness are the next most frequent complaints" following whiplash injury."

"Between 40% and 70% of those suffering from persistent WAD have these symptoms [dizziness and unsteadiness] and they are often associated with reports of loss of balance and falls."

Disturbances to the postural control system are the likely cause of dizziness and unsteadiness symptoms, "due to traumatic damage to the vestibular receptors, neck receptors, or directly to the central nervous system."

"When there is no traumatic brain injury, abnormal cervical afferent input from damaged or functionally impaired neck joint and muscle receptors is considered the likely cause." (5 references) **[WOW, Very Important]**

Dizziness of cervical origin "originates from abnormal afferent activity from the extensive neck muscle and joint proprioceptors, which converges in the central nervous system with vestibular and visual signals, confusing the postural control system." **[abnormal afferent activity from the extensive neck muscle and joint proprioceptors is synonymous with chiropractic subluxation complex with nerve interference to me]**

True vertigo, consisting of environment and self spinning, is associated with vestibular pathology.

In contrast, Cervicogenic dizziness is marked by "perceptual symptoms of disorientation and vague unsteadiness," with episodes lasting minutes to hours.

Cervicogenic dizziness is exacerbated with neck movements or increased neck pain.

Cervicogenic dizziness often has a temporal relationship with neck pain, injury or pathology.

"An objective measure of neck reposition sense (joint position error (JPE)), may relate well to cervicogenic dizziness, as it is considered primarily to reflect afferent input from the neck joint and muscle receptors." **[IMPORTANT]**

Joint position error (JPE) is based on the ability to relocate the natural head posture.

Studies show that subjects complaining of dizziness have greater neck repositioning errors than subjects who did not.

"This suggests that subjects with complaints of dizziness and unsteadiness may have these symptoms as a result of a greater degree of abnormal afferent input from the cervical mechanoreceptors." **[i.e. they are subluxated]**

In this study:

105 chronic (more than 3 months since injury) WAD patients were evaluated. No subject gave a history of head injury, unconsciousness, or prior dizziness.

96 subjects were Quebec Wad II.

9 subjects were Quebec WAD III.

Each subject's ability to relocate the natural head posture was tested after active cervical movements of left and right rotation and extension.

The WAD subjects used between 1–14 descriptors for dizziness.

The most common words used were "lightheaded", "unsteady" and "off-balance".

Other descriptions were:

Clumsy, giddy, imbalance, motion sickness, falling/veering to one side, imbalance in the dark, vision jiggle (disturbance), faint feeling, might fall.

"Unsteadiness was the most common description (90%)."

Exacerbating features to the dizziness were increased neck pain, headache, neck positions or movement.

"Concurrent symptoms of headache, nausea, blurred vision and decreased concentration were also reported."

The average intensity of dizziness or unsteadiness was 4.8 (1 - 9.8) on a 10cm visual analogue scale.

52% of subjects reported daily symptoms.

25% reported symptoms several times per week.

The duration of symptoms was a few seconds to minutes in 88% of the subjects.

21% reported actual falls associated with loss of balance.

90% eased their symptoms by either standing or sitting still.

The onset of symptoms was either immediately or within 24 hours of the accident in 68%.

15% reported onset within 1 week of the injury.

17% reported delayed onset of these symptoms.

59% of WAD subjects were taking a combination of at least 2 types of medications.

[WOW]

18% were taking analgesics
 9% were taking NSAIDS
 1% was taking psychotropic medication

ONLY 13% were not using any medication. **[AMAZING]**

DISCUSSION

"The results of this study indicate the presence of deficits in cervical mechanoreceptor function in WAD."

"JPEs were significantly greater in WAD subjects than in the healthy control group, confirming results from previous studies."

"WAD subjects overshoot the neutral position on return from extension more often than controls."

"Overshooting is thought to compensate for decreased proprioceptive information, by searching for additional information from stretched antagonistic muscles."

"The results of this study also indicate that the WAD subjects with dizziness have greater deficits in cervical mechanoreceptor function."

WAD subjects without dizziness have some deficits in cervical mechanoreceptor dysfunction, "but to a lesser or different degree than those complaining of dizziness/unsteadiness." **[IMPORTANT: this indicates that patients can have subluxation and nerve interference and not have dizziness]**

The frequency of dizziness in this WAD group was 74.5% of 105 subjects.

83% of WAD subjects "reported that the dizziness commenced immediately after or within one week of the accident."

"This may be due to direct damage to the cervical mechanoreceptors following the accident, the barrage of abnormal afferent input due to the sudden acceleration/deceleration forces placed on cervical structures and/or the effects of pain and inflammatory mediators on proprioceptive activity." **[Great Sentence]**

"The 17% who reported delayed onset of symptoms tended to have higher joint position errors than the group with early onset. This perhaps suggests that the development of symptoms may be as a result of prolonged altered range of movement and decreased neuromuscular control rather than a random occurrence." **[WOW, like a chronic subluxation complex]**

“The tendency for larger JPEs in the group with delayed onset may also suggest that prolonged altered range of movement and neuromuscular control generates as much if not more problems for cervical proprioception than the initial proprioceptive barrage following the accident.” **[AGAIN, WOW: This suggests that long-term subluxations are more problematic neurologically than the event that caused the subluxation in the first place]**

“The increased JPE in the WAD subjects complaining of dizziness suggests a cervical cause of the dizziness.”

Cervicogenic vertigo commonly presents as unsteadiness and lightheadedness, and in this study 90% of subjects reported unsteadiness and 65% reported lightheadedness.

Experimentally induced cervical vertigo causes unsteadiness, ataxia and a tendency to fall, and 48% of subjects reported of loss of balance.

83% of subjects reported early onset of symptoms coinciding with cervical injury.

These authors “contend that our results support a likely cervical cause of dizziness and or unsteadiness rather than other causes of dizziness in these subjects with persistent WAD and the JPE findings highlighting the role of cervical mechanoreceptor dysfunction.”

Studies have shown that WAD altered cervical afferent input **[subluxation complex]** causes eye movement dysfunction and altered smooth pursuit eye movement control.

The altered cervical afferent input **[subluxation complex]** in WAD is caused initially by the “acceleration and deceleration forces placed on the neck muscle attachments and their proprioceptors” and then “perpetuated by pain and associated increased muscle tension.”

The authors suggest that “abnormal cervical afferent input” **[subluxation complex]** causes both WAD dizziness and chronic symptoms.

Studies have demonstrated “improvements in extension repositioning error following acupuncture and manipulation.”

In WAD subjects, “cervical rotation could cause a mismatch between abnormal information from cervical and normal information from vestibular input with dizziness as the consequence.”

Extension deficits reflect overall “alteration of cervical afferent input from the cervical mechanoreceptors.” **[subluxation complex]**

Management with acupuncture and manipulation may address some of the alteration of cervical afferent input deficits.

“The study highlights the role of cervical mechanoreceptor dysfunction and the importance of assessment and management of this impairment in persistent WAD, particularly in those complaining of dizziness and unsteadiness.”

KEY POINTS FROM DAN MURPHY

- (1) 12% to 40% of whiplash-injured patients will become chronic.
- (2) Dizziness and unsteadiness are second only to pain as the most frequent complaints following whiplash injury, found in 40% to 70% of those with chronic WAD.
- (3) Whiplash injury causes damage or functionally impaired neck joints and muscles.
- (4) Injured or functionally impaired neck joints and muscles cause altered cervical mechanoreceptor afferent input into the spinal cord and brainstem.
- (5) Cervical mechanoreceptor dysfunction causes dizziness.
- (6) Cervical mechanoreceptor dysfunction causes eye movement dysfunction.
- (7) The altered cervical mechanoreceptor afferent input caused by whiplash can be perpetuated by pain and inflammation.
- (8) Whiplash symptoms may become chronic because of prolonged altered range of movement, resulting prolonged altered mechanical afferent input, like **a chronic subluxation complex**.
- (9) The prolonged reduced range of movement causes more cervical proprioception problems than the initial proprioceptive barrage caused by the accident.
- (10) Whiplash caused abnormal cervical afferent input causes both dizziness and chronic symptoms.
- (11) Acupuncture and manipulation can improve the alteration of cervical afferent input.
- (12) 87% of chronic (longer than 3 months) WAD subjects were taking drugs.