

## Neck Pain

### THE EXTENT OF THE PROBLEM

#### 1. Neck pain is a global problem

Neck pain is one of the most common musculoskeletal conditions on a global scale [35]. Neck pain has been defined based on e.g. anatomic landmarks, severity or duration of pain as well as reason for onset (e.g. trauma, work-related or unknown/idiopathic)[23; 29; 30]. Despite increasing knowledge on neck pain and underlying causes, it is not possible to identify a specific lesion in the majority of cases with current standard imaging and laboratory tests [5; 19].

#### 2. Gender and age differences

Neck pain is more commonly reported in women compared to men while the prevalence follows similar trajectories in both sexes, peaking around the age of 50 years (♀50-54 ♂45-49) and declining thereafter [35].

### COMMON FINDINGS IN PEOPLE WITH NECK PAIN

While many different aspects of neck pain have been investigated, a few of the most frequent findings are outlined here.

#### 3. Common findings from diagnostic imaging

Degenerative changes in the cervical spine are a common feature in people seeking care for their neck pain. However, while neck pain is often attributed to such degenerative changes, this is often not the case. The prevalence of degenerative changes seems to be comparable between clinical and pain free populations [18]. Similarly, degenerative changes progress over time without being related to development / worsening of neck pain except for conditions such as stenosis [11].

#### 4. Neck pain and posture

Spinal pain is commonly attributed to sub-optimal posture [26; 37]. While there are studies indicating a potential relationship between “poor” postural shape and neck pain, this relationship is not always clear and postures during functional tasks may be more relevant [17; 39; 40; 42]. Studies from the adult and adolescent populations indicate that an association between static postural shape and neck pain may simply be coincidental rather than causative [20; 34] while the nature of such associations during functional tasks remains unclear. Taken together, interpreting posture in neck pain patients should be done with care as the relationship may not be as simple as often assumed.

#### 5. Neck pain and headache

Neck pain has been associated with both primary headaches such as tension type headache and migraine as well as secondary headaches with the most common one being cervicogenic headache where cervical structures are a direct cause of the headache [1; 6; 8; 24; 27]. With this in mind, it is essential that clinicians consider the neck in the assessment and potentially in the chosen

management strategies, depending on the type of headache and whether the neck pain is related to cervical musculoskeletal dysfunction [24].

#### **6. Neck pain alters control of muscles**

A common feature of neck pain is altered neck and axioscapular muscle function [7; 9; 14], and to varied extents, impaired kinesthetic sense [12; 38], reduced movement variability and increased trunk stiffness [2; 15].

#### **7. Neck pain and pain sensitivity**

Widespread hypersensitivity is not often seen in idiopathic neck pain but can be a feature in whiplash-related neck pain [9; 10; 36]. In cases where widespread hypersensitivity is observed, facilitated central pain mechanisms are suggested to underlie such findings [9; 10; 36].

#### **8. Neck pain, thoughts, beliefs and sleeps disturbances**

Like other painful spinal conditions, unhelpful thoughts, negative emotion and problems with sleeping can be related with persistent neck pain and if present, these should be considered in the management strategy [28; 32].

### **MANAGEMENT OF NECK PAIN**

Many different management strategies exist for neck pain and no single modality can address all issues. Instead, a multimodal patient-centered approach is recommended where modalities such as exercise and manual therapy can be used in addition to a thorough patient-specific explanation (including possible underlying reasons for the condition and potential work practice and self-management strategies).

#### **9. Neck pain and exercise**

Exercise is useful in the rehabilitation of neck pain, where both neck specific and more general exercises have shown effective for reducing pain and disability and restoring muscle function [4; 13; 21]. Although most studies find a beneficial effect of exercise, there is currently no consensus on the appropriate dosage [41]. When choosing a management strategy for neck pain patients there are many factors to consider. It is important to address the specific issue at hand as different exercise interventions target different impairments. Some exercises may for instance, be better at increasing strength or endurance of neck muscles while others may be better suited for improving motor control or cervical kinesthetic sense [4; 31]. Moreover, it is important that the intervention of choice is patient-centered and, when possible accommodates both patient and clinician preferences [3; 25]. Taken together, an individualized exercise approach is believed to provide better outcome compared to a standardized exercise approach [16].

#### **10. Neck pain and manual therapy**

Manual treatment can be useful as part of a multimodal approach for managing neck pain and has been proven effective with regards to pain and disability [22]. When adding manual therapy to the management strategy, it should account for patient and clinician preferences and must be aligned with contemporary knowledge of the pain system [33].

## REFERENCES

- [1] Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. *Cephalalgia* 2018;38(1):1-211.
- [2] Alsultan F, De Nunzio AM, Rushton A, Heneghan NR, Falla D. Variability of neck and trunk movement during single- and dual-task gait in people with chronic neck pain. *Clinical Biomechanics* 2020;72:31-36.
- [3] Blanpied PR, Gross AR, Elliott JM, Devaney LL, Clewley D, Walton DM, Sparks C, Robertson EK. Neck Pain: Revision 2017. *Journal of Orthopaedic & Sports Physical Therapy* 2017;47(7):A1-A83.
- [4] Blomgren J, Strandell E, Jull G, Vikman I, Roijezon U. Effects of deep cervical flexor training on impaired physiological functions associated with chronic neck pain: a systematic review. *BMC musculoskeletal disorders* 2018;19(1):415.
- [5] Bogduk N. The anatomy and pathophysiology of neck pain. *Phys Med Rehabil Clin N Am* 2011;22(3):367-382, vii.
- [6] Bogduk N, Govind J. Cervicogenic headache: an assessment of the evidence on clinical diagnosis, invasive tests, and treatment. *Lancet Neurol* 2009;8(10):959-968.
- [7] Castelein B, Cools A, Parlevliet T, Cagnie B. Are chronic neck pain, scapular dyskinesia and altered scapulothoracic muscle activity interrelated?: A case-control study with surface and fine-wire EMG. *J Electromyogr Kinesiol* 2016;31:136-143.
- [8] Castien R, De Hertogh W. A Neuroscience Perspective of Physical Treatment of Headache and Neck Pain. *Front Neurol* 2019;10:276-276.
- [9] Christensen SW, Hirata RP, Graven-Nielsen T. Altered pain sensitivity and axioscapular muscle activity in neck pain patients compared with healthy controls. *Eur J Pain* 2017.
- [10] Coppieters I, De Pauw R, Kregel J, Malfliet A, Goubert D, Lenoir D, Cagnie B, Meeus M. Differences Between Women With Traumatic and Idiopathic Chronic Neck Pain and Women Without Neck Pain: Interrelationships Among Disability, Cognitive Deficits, and Central Sensitization. *Phys Ther* 2017;97(3):338-353.
- [11] Daimon K, Fujiwara H, Nishiwaki Y, Okada E, Nojiri K, Watanabe M, Katoh H, Shimizu K, Ishihama H, Fujita N, Tsuji T, Nakamura M, Matsumoto M, Watanabe K. A 20-Year Prospective Longitudinal Study of Degeneration of the Cervical Spine in a Volunteer Cohort Assessed Using MRI. *The Journal of Bone and Joint Surgery* 2018;100(10):843-849.
- [12] de Vries J, Ischebeck BK, Voogt LP, van der Geest JN, Janssen M, Frens MA, Kleinrensink GJ. Joint position sense error in people with neck pain: A systematic review. *Man Ther* 2015;20(6):736-744.
- [13] de Zoete RM, Armfield NR, McAuley JH, Chen K, Sterling M. Comparative effectiveness of physical exercise interventions for chronic non-specific neck pain: a systematic review with network meta-analysis of 40 randomised controlled trials. *Br J Sports Med* 2020.
- [14] Falla D. Unravelling the complexity of muscle impairment in chronic neck pain. *Man Ther* 2004;9(3):125-133.
- [15] Falla D, Gizzi L, Parsa H, Dieterich A, Petzke F. People With Chronic Neck Pain Walk With a Stiffer Spine. *The Journal of orthopaedic and sports physical therapy* 2017;47(4):268-277.
- [16] Falla D, Hodges PW. Individualized Exercise Interventions for Spinal Pain. *Exerc Sport Sci Rev* 2017;45(2):105-115.
- [17] Falla D, Jull G, Russell T, Vicenzino B, Hodges P. Effect of neck exercise on sitting posture in patients with chronic neck pain. *Phys Ther* 2007;87(4):408-417.
- [18] Farrell SF, Smith AD, Hancock MJ, Webb AL, Sterling M. Cervical spine findings on MRI in people with neck pain compared with pain-free controls: A systematic review and meta-analysis. *J Magn Reson Imaging* 2019;49(6):1638-1654.
- [19] Ferrari R, Russell AS. Regional musculoskeletal conditions: neck pain. *Best Pract Res Clin Rheumatol* 2003;17(1):57-70.
- [20] Grob D, Frauenfelder H, Mannion AF. The association between cervical spine curvature and neck pain. *Eur Spine J* 2007;16(5):669-678.
- [21] Gross A, Kay TM, Paquin JP, Blanchette S, Lalonde P, Christie T, Dupont G, Graham N, Burnie SJ, Gelley G, Goldsmith CH, Forget M, Hoving JL, Bronfort G, Santaguida PL, Cervical Overview G. Exercises for mechanical neck disorders. *Cochrane Database Syst Rev* 2015;1:CD004250.
- [22] Gross A, Langevin P, Burnie SJ, Bedard-Brochu MS, Empey B, Dugas E, Faber-Dobrescu M, Andres C, Graham N, Goldsmith CH, Bronfort G, Hoving JL, LeBlanc F. Manipulation and mobilisation for neck pain contrasted against an inactive control or another active treatment. *Cochrane Database Syst Rev* 2015;9(9):CD004249.
- [23] Guzman J, Hurwitz EL, Carroll LJ, Haldeman S, Côté P, Carragee EJ, Peloso PM, van der Velde G, Holm LW, Hogg-Johnson S, Nordin M, Cassidy JD. A New Conceptual Model of Neck Pain: Linking Onset, Course, and Care: The Bone and Joint Decade 2000–2010 Task Force on Neck Pain and Its Associated Disorders. *European Spine Journal* 2008;17(Suppl 1):14-23.
- [24] Jull G, Hall T. Cervical musculoskeletal dysfunction in headache: How should it be defined? *Musculoskeletal Science and Practice* 2018;38:148-150.
- [25] Kjaer P, Kongsted A, Hartvigsen J, Isenberg-Jørgensen A, Schiøttz-Christensen B, Sjøborg B, Krog C, Møller CM, Halling CMB, Lauridsen HH, Hansen IR, Nørregaard J, Jørgensen KJ, Hansen LV, Jakobsen M, Jensen MB, Melbye M, Duel P, Christensen SW, Povlsen TM. National clinical guidelines for non-surgical treatment of patients with recent onset neck pain or cervical

- radiculopathy. *European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society* 2017;26(9):2242-2257.
- [26] Korakakis V, O'Sullivan K, O'Sullivan PB, Evagelinou V, Sotiralis Y, Sideris A, Sakellariou K, Karanasios S, Giakas G. Physiotherapist perceptions of optimal sitting and standing posture. *Musculoskelet Sci Pract* 2019;39:24-31.
- [27] Liang Z, Galea O, Thomas L, Jull G, Treleaven J. Cervical musculoskeletal impairments in migraine and tension type headache: A systematic review and meta-analysis. *Musculoskelet Sci Pract* 2019;42:67-83.
- [28] Liu F, Fang T, Zhou F, Zhao M, Chen M, You J, Jin Y, Xie J, Liu Z. Association of Depression/Anxiety Symptoms with Neck Pain: A Systematic Review and Meta-Analysis of Literature in China. *Pain Res Manag* 2018;2018:3259431-3259431.
- [29] Merskey H, Bogduk N, International Association for the Study of Pain. Task Force on Taxonomy. Classification of chronic pain : descriptions of chronic pain syndromes and definitions of pain terms. Seattle: IASP Press, 1994.
- [30] Misailidou V, Malliou P, Beneka A, Karagiannidis A, Godolias G. Assessment of patients with neck pain: a review of definitions, selection criteria, and measurement tools. *J Chiropr Med* 2010;9(2):49-59.
- [31] O'Leary S, Jull G, Kim M, Uthairkhum S, Vicenzino B. Training mode-dependent changes in motor performance in neck pain. *Arch Phys Med Rehabil* 2012;93(7):1225-1233.
- [32] Park SJ, Lee R, Yoon DM, Yoon KB, Kim K, Kim SH. Factors associated with increased risk for pain catastrophizing in patients with chronic neck pain: A retrospective cross-sectional study. *Medicine (Baltimore)* 2016;95(37):e4698-e4698.
- [33] Rabey M, Hall T, Hebron C, Palsson TS, Christensen SW, Moloney N. Reconceptualising manual therapy skills in contemporary practice. *Musculoskelet Sci Pract* 2017;29:28-32.
- [34] Richards KV, Beales DJ, Smith AJ, O'Sullivan PB, Straker LM. Neck Posture Clusters and Their Association With Biopsychosocial Factors and Neck Pain in Australian Adolescents. *Phys Ther* 2016;96(10):1576-1587.
- [35] Safiri S, Kolahi A-A, Hoy D, Buchbinder R, Mansournia MA, Bettampadi D, Ashrafi-Asgarabad A, Almasi-Hashiani A, Smith E, Sepidarkish M, Cross M, Qorbani M, Moradi-Lakeh M, Woolf AD, March L, Collins G, Ferreira ML. Global, regional, and national burden of neck pain in the general population, 1990-2017: systematic analysis of the Global Burden of Disease Study 2017. *BMJ* 2020;368:m791.
- [36] Scott D, Jull G, Sterling M. Widespread sensory hypersensitivity is a feature of chronic whiplash-associated disorder but not chronic idiopathic neck pain. *The Clinical journal of pain* 2005;21(2):175-181.
- [37] Slater D, Korakakis V, O'Sullivan P, Nolan D, O'Sullivan K. "Sit Up Straight": Time to Re-evaluate. *J Orthop Sports Phys Ther* 2019;49(8):562-564.
- [38] Stanton TR, Leake HB, Chalmers KJ, Moseley GL. Evidence of Impaired Proprioception in Chronic, Idiopathic Neck Pain: Systematic Review and Meta-Analysis. *Phys Ther* 2016;96(6):876-887.
- [39] Szeto GP, Straker LM, O'Sullivan PB. A comparison of symptomatic and asymptomatic office workers performing monotonous keyboard work--2: neck and shoulder kinematics. *Man Ther* 2005;10(4):281-291.
- [40] Szeto GPY, Straker L, Raine S. A field comparison of neck and shoulder postures in symptomatic and asymptomatic office workers. *Appl Ergon* 2002;33(1):75-84.
- [41] Wilhelm MP, Donaldson M, Griswold D, Learman KE, Garcia AN, Learman SM, Cleland JA. The Effects of Exercise Dosage on Neck-Related Pain and Disability: A Systematic Review With Meta-analysis. *J Orthop Sports Phys Ther* 2020;50(11):607-621.
- [42] Yip CHT, Chiu TTW, Poon ATK. The relationship between head posture and severity and disability of patients with neck pain. *Man Ther* 2008;13(2):148-154.

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