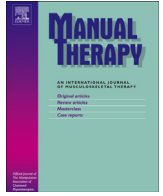


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Patients with non-specific neck disorders commonly report upper limb disability

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ABSTRACT

Patients with neck disorders can report difficulties with functional use of their upper limb because of their neck pain. Yet, there is little information on the frequency and specifically, the nature of these upper limb activities. This study surveyed patients with neck pain disorders ($n = 103$) presenting for management at private physiotherapy clinics in a large metropolitan area to investigate the frequency and nature of reduced upper limb function. Participants were asked to complete four questionnaires, the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, the Neck Disability Index (NDI), Pictorial Fear of Activity Scale–Cervical (PFACT-S-C) and Patient Specific Functional Scale (PSFS). Approximately 80% of patients spontaneously reported that upper limb activities aggravated their neck pain (PSFS). Most frequently, these activities involved loading of the upper limb such as lifting. Eight activity items on the DASH were scored positive by $\geq 50\%$ of participants. Participants had mild to moderately severe neck pain (NDI: range 2–68%). The DASH and NDI were moderately-highly correlated ($\rho = 0.669$; $p < 0.001$), indicating the higher the neck pain severity the greater the upper limb functional restrictions. There was a low correlation between the NDI and PFACT-S-C ($\rho = 0.319$; $p = 0.001$). These findings provide evidence that upper limb function is often impaired in association with neck pain disorders and suggest clinicians should routinely question patients regarding upper limb function. The DASH could be used as a suitable outcome measure in its current or possibly a modified form.

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1. Introduction

Patients with neck disorders may report associated upper limb symptoms and/or neck pain with upper limb activities (McLean et al., 2011). This is quite apparent in patients with cervical radiculopathy (Radhakrishnan et al., 1994) but upper limb activities can aggravate neck pain in the absence of arm symptoms (Frank et al., 2005; Huisstede et al., 2009; McLean et al., 2011). A variety of mechanisms may account for this occurrence, including mechanical loading. Cervical segments move when the upper limb is loaded (Takasaki et al 2009) and loads placed through the upper limb transmit to cervical structures via axio-scapular muscles, such as levator scapulae and upper trapezius (Behrsin and Macguire, 1986). These forces may stress painful cervical structures leading to a pain response that inhibits performance of upper limb activity. This loading could be increased if scapular control is impaired due to altered muscle activation patterns as a result of neck pain (Nederhand et al., 2002; Falla et al., 2004; Helgadottir et al., 2010).

Despite a number of studies investigating mechanistic links between neck disorders and upper limb function, there is little information on the frequency and specifically, the nature of upper limb activities that may aggravate neck pain. This may reflect the lack of use of upper limb functional outcome measures in neck disorder studies (McLean et al., 2007). One outcome measure that has been employed in investigations of neck pain patients is the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire (Huisstede et al., 2009; McLean et al., 2010; McLean et al., 2011). Huisstede et al. (2009) identified the DASH as a valid and responsive measure in its application with non-traumatic neck disorders. The Pictorial Fear of Activity Scale–Cervical (PFACT-S-C) (Turk et al., 2008) is another outcome measure of potential use and interest. This pictorial questionnaire was designed to specifically measure fear of activity in patients with neck disorders, a psychological factor that may impede recovery (Pool et al., 2010). Of relevance, the PFACT-S-C contains images depicting loads born by the upper limb in various positions of the neck and arms, giving it potential as a surrogate measure of perceived upper limb disability. Nevertheless standardised questionnaires such as the DASH and PFACT-S-C provide information on a set of defined items and may not be sufficiently patient-specific. Information about the impact of neck

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pain on upper limb function may be more accurately inferred from patients' spontaneous reporting of impaired activities. The Patient Specific Functional Scale (PSFS) is a tool which elicits such spontaneous reporting (Westaway et al., 1998).

The one study to date investigating the influence of neck pain on upper limb function investigated in the main, patients with more severe neck pain drawn from a population attending hospital clinics (McLean et al., 2011). This patient group may not be representative of the more general community who present to private physiotherapy settings. The aim of this study was to survey patients with neck pain disorders presenting for physiotherapy management in the general community. Specifically the study investigated (1) the frequency with which patients with neck pain disorders reported difficulties with upper limb function (PSFS), (2) positive responses on the DASH and a modified version of the PFAcS-C, and (3) explored relationships between the DASH, NDI (Neck Disability Index) and PFAcS-C scores.

2. Methods

2.1. Participants

A sample of convenience of 103 volunteers experiencing non-specific neck pain participated in this study. Participants were recruited from 12 private musculoskeletal physiotherapy practices located in a large metropolitan area. Patients of either gender were included if they were aged between 18 and 70 years, currently experiencing a neck disorder of sufficient intensity to seek physiotherapy treatment and possessed English proficiency to independently complete the questionnaires. Patients with cervical radiculopathy (clinical neurological signs) were excluded, as were those with an existing upper limb pathology or comorbid condition that may affect upper limb function. Ethical approval for the study was granted from the Institutional Medical Research Ethics Committee. Each participant provided written informed consent.

2.2. Measurements

This was a cross-sectional study. Participants provided demographic information and completed four questionnaires, which consisted of the NDI, the DASH, a modified version of the PFAcS-C and a PSFS.

2.3. Participant demographics

Demographics sought were age, gender, area of pain, pain intensity (neck and arm) and duration of neck pain. Participants indicated their areas of pain by shading a body chart and ticking a box to specify the area of greatest intensity. Average pain intensity over the past week was measured on a 0–10 visual analogue scale (VAS) anchored with the words 'no pain at all' and 'worst pain imaginable'. Participants provided information on the duration of their neck disorder, both the length of time (weeks) of their current episode and the total length of history of neck pain (years).

2.4. Neck disability index (NDI)

The NDI was used to measure current severity of neck pain and disability. The NDI is a 10 item questionnaire designed to measure self-reported functional impairment due to neck pain in activities of daily living (Vernon and Mior, 1991). Each item is rated on a 0–5 scale. The item scores are summed to provide a total out of 50, which is converted to a percentage. The NDI has been used extensively in clinical and research settings, and has proven validity and reliability (Vernon and Mior, 1991).

2.5. Disability of the arm, shoulder and hand questionnaire (DASH)

Upper limb disability was measured using the DASH (Hudak et al., 1996). The DASH contains 30 items relating to arm, shoulder and hand disability. Twenty-one of these items refer to specific upper limb activities, 3 to general daily activities, 5 to specific upper limb symptoms and 1 to self-efficacy. Each item is scored on a 5-point Likert scale. Individual item scores are summed, divided by the number of responses, subtracted by one and multiplied by 25 to provide a score out of 100. The DASH has been tested for validity and responsiveness in a neck pain population (Huisstede et al., 2009).

2.6. Pictorial fear of activity scale – cervical (PFAcS-C)

The standard PFAcS-C comprises of 19 pictures (18 weight-bearing, one non-weight bearing) (Turk et al., 2008). Patients rate the pictures by marking a 10 cm fear VAS scale anchored with 'no fear at all' and 'extremely fearful' of performing the action in the picture. The weight bearing pictures depict holding an attaché case with arms at sides, shoulder height and overhead, with the neck in flexion, extension, right and left lateral flexion and rotation for each position. The non-weight bearing picture shows neck flexion with arms overhead. Totals scores for Fear ratings were calculated as the sum of individual item scores. Male and female picture sets were used to avoid gender bias.

For exploratory purposes in this study, an additional section was appended to the PFAcS-C to gain further detail on the scope of upper limb function. Seven extra pictures were included depicting upper limb specific positions (left and right shoulder abduction at 90° and 180°) and functional tasks (holding a saucepan in left and right hands, and carrying shopping bags). Participants were also asked to provide VAS ratings for (expected) pain for each item after their rating of fear. The 'Pain' scale was anchored with the words 'no pain at all' and 'worst pain imaginable'. Scores were measured as the distance in centimetres from the 'zero' ends. Totals scores for Pain were calculated as the sum of individual item scores.

2.7. Patient specific functional scale (PSFS)

Patient-specific reports of impaired functional activities were recorded using the PSFS (Westaway et al., 1998). Participants were asked to list up to five different activities with which they had difficulty due to their neck disorder. Each activity was rated on an 11-point numerical rating scale, where 0 = unable to perform activity and 10 = able to perform activity at the same level before any neck pain or injury. Participants were also requested to indicate the limiting factor for each activity e.g. neck pain, stiffness. For activities that included both upper limb and neck movement e.g. hanging the washing on the line, participants were asked to clarify whether the aggravating factor was arm or head/neck movement.

2.8. Procedure

The study was undertaken on site in the participating practices. The treating physiotherapists were fully informed of the inclusion and exclusion criteria and screened current patients receiving treatment to identify those suitable to participate. They provided suitable patients with information about the study and gained their initial interest. On agreeing to participate, patients received full information from the principal researcher and consented to enter the study. Each participant completed the five questionnaires relating to their neck disorder, following the standard instructions of the respective questionnaires. The order in which the questionnaires were administered was randomly assigned using a

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