



Original article

Characteristics of visual disturbances reported by subjects with neck pain



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ABSTRACT

Visual symptoms are often reported by patients with neck pain. The aim of the study was to report on the prevalence and most troublesome visual disturbances in subjects with neck pain. Seventy subjects with neck pain and seventy healthy control subjects answered questions about the presence and magnitude (/12) – product of frequency (0–4) and intensity (0–3) of each of 16 visual symptoms noted to be associated with neck pain and other possible causes. A visual complaint index (VCI) (/168) was generated from the sum of the magnitude rating of 14 significant symptoms. The neck pain group had significantly ($P > 0.05$) greater prevalence and magnitude of 14/16 visual complaints and VCI (mean 27.4) compared to control subjects (mean 6.2). The most prevalent symptoms were 'need to concentrate to read' (70%) and 'sensitivity to light' (58.6%). The least prevalent were 'double vision' (28.6%) and 'dizzy reading' (38.6%). The most troublesome symptoms (greatest magnitude) were 'need to concentrate to read' (3.4/12), 'visual fatigue' (3/12), 'difficulty judging distances' (2.1/12) and 'sensitivity to light' (2.1/12) while the least troublesome complaints were 'double vision' (0.5/12), 'red eyes' (1/12) and 'spots and words moving' (1/12). The characteristics of the visual symptoms were mostly consistent for those previously associated with neck pain. Subjects with traumatic neck pain had a significantly higher VCI compared to those with idiopathic neck pain. The results could help with differential diagnosis. The visual symptoms might be related to eye movement control disturbances in neck pain, however further research is required.

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1. Introduction

Visual disturbances along with symptoms of dizziness and unsteadiness are reported in those with neck pain (Hülse and Holz, 2000). The potential mechanism for these symptoms includes a mismatch of information between the cervical afferents and the vestibular and visual systems (Brandt, 1996). This is supported by the fact that visual disturbances or illusions have been reported in asymptomatic individuals after the cervical afferents have been artificially disturbed (De Jong et al., 1977; Karnath et al., 2002).

In people with neck pain, visual complaints might be related to identified deficits in oculomotor control and disturbances in gaze stability and head eye co-ordination, particularly in those who have sustained a whiplash injury (Hildingsson et al., 1989; Heikkilä and Wenngren, 1998; Tjell and Rosenhall, 1998; Kelders et al., 2005; Treleaven et al., 2005; Storaci et al., 2006; Treleaven et al., 2011). Further, visual complaints, in subjects with whiplash, have shown potential to negatively affect the patient's quality of life for visually

demanding functional tasks such as reading and driving (Gimse et al., 1997a, 1997b; Takasaki et al., 2011; Takasaki et al., 2013).

Some specific visual complaints, such as blurred vision, words jumping on the page, or difficulty focussing or concentrating to read, have been suggested to be associated with neck pain while other symptoms such as double vision are thought to be rare (Hülse, 1998). Nevertheless it is not known which visual symptoms are the most prevalent and troublesome in those with neck pain. This information could be useful to assist with differential diagnosis and direction for management as several other potential causes of visual symptoms, such as disordered focal vision, oculomotor disorders, migraine, vertebral artery insufficiency and or vestibular pathology, should be considered in those with neck pain, especially those who have had a whiplash injury.

For example, symptoms commonly seen in those with disordered focal vision, such as tiredness, itchy and dry eyes, are becoming increasingly prevalent in society due to the increased use of computers. Computer vision strain is now a recognised entity, which could co-exist in those with neck pain and has been suggested to be a possible cause of neck complaints (Thorud et al., 2012). Similarly, photophobia, double or blurred vision can be associated with convergence or accommodation insufficiency and

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eye alignment malfunctions which have been demonstrated in some following a whiplash injury (Brown, 2003; Storaci et al., 2006), possibly as a consequence of damage to the ambient visual system (Padula and Argyris, 1996).

Double vision, spots in the eyes and sensitivity to light, are considered to be associated with neurological disturbances, such as vertebral artery insufficiency or migraine, (Demarquay and Montavont, 2010; Friedman et al., 2011) or vestibular pathology which could be concomitant in neck pain due to, a past history, degeneration from ageing (Herdman, 2000) or damage to the delicate peripheral vestibular apparatus as a result of a whiplash injury (Rowlands et al., 2009; Dispenza et al., 2011) should also be considered as potential causes of visual disturbances associated with neck pain.

Thus the primary aim of the study was to report the prevalence and most troublesome visual disturbances in subjects with neck pain when compared to healthy individuals considering symptoms suggested to be related to the neck as well as other potential causes. Secondary aims included comparison of the magnitude and prevalence of visual symptoms in subjects with traumatic neck pain or whiplash associated disorder (WAD) and subjects with idiopathic neck pain (INP) and to determine any relationships between overall visual complaint magnitude and neck pain, dizziness and age. It was hypothesised that some visual complaints would be more prevalent and troublesome than others in neck pain compared to healthy asymptomatic subjects. It was also hypothesised that the magnitude of the visual complaints would be greater in subjects with whiplash compared to idiopathic neck pain and would be associated with elevated neck pain and disability and dizziness handicap.

2. Methods

2.1. Participants

Seventy volunteers with chronic neck pain and 70 asymptomatic healthy volunteers aged 18 to 60 were recruited from the university and local community.

Volunteers with chronic neck pain of traumatic or idiopathic origin were included if they had pain of at least three months duration, and a Neck Disability Index (NDI) score of at least 10 out of 100 (Vernon, 1996). Asymptomatic control subjects were matched against the neck pain subjects for age, gender and glasses use.

The exclusion criteria consisted of neck trauma associated with post-traumatic amnesia or concurrent head injury, cervical fracture/dislocation, known vestibular pathology and neurological/cardiovascular/respiratory conditions. Healthy volunteers were also excluded if they had current or a history of chronic head/neck/upper limb pain or trauma.

2.2. Measurements and procedure

All participants completed both a general questionnaire concerning demographic characteristics and use of glasses or contact lens and the Dizziness Handicap Index short form (DHIsf) (Tesio et al., 1999), where a low score out of 13 indicates greater levels of perceived handicap associated with dizziness. Participants in the neck pain group also completed a general questionnaire detailing their history of pain and completed the NDI to assess subjective symptoms and disability in activities of daily living associated with neck pain (Vernon, 1996), where higher percentage scores indicate greater disability due to pain.

All participants then completed a proforma relating to 16 visual disturbances or complaints. These were both vision specific items (eg 'red eyes', 'itchy eyes') and vision related items (eg 'fatigue').

The sixteen items were chosen to reflect those thought to be associated with focal disorders, vestibular, ambient vision, neurological and neck pain. The items thought to be associated with focal disorders were 'heavy eyes', 'sore eyes', 'red eyes', 'eye strain', 'visual fatigue', 'squinting', 'itchy eyes', and 'hard to focus on close work' (Rempel et al., 2007; Yan et al., 2008). Those thought to be associated with vestibular pathology, migraine, ambient vision disturbance or vertebral artery insufficiency were 'double vision', 'spots in eyes', 'sensitivity to light' and 'dizziness when reading' (Bronstein, 2005; Thomas et al., 2011). Symptoms that have previously been suggested to be associated with neck pain were 'blurred vision', 'words or objects moving', 'needing to concentrate to read' and 'difficulty judging distances' (Hülse and Holz, 2000; Kristjansson and Treleaven, 2009). For each visual symptom, participants were asked to indicate the average intensity from three choices (1 = mild, 2 = moderate, 3 = severe) and average frequency from 4 choices (1 = Rare, 2 = Occasional, 3 = Frequent, 4 = Always). If they did not experience the symptom, they were asked to leave these blank (ie, zero score). Questionnaires were reviewed by the investigators to ensure that all items left blank were intentional.

2.3. Statistical analysis

An independent sample *t*-test was used to assess comparability of age and a Fisher's exact test was used for gender and contacts/glasses use between the control and neck pain group. Whether or not the participant reported each visual symptom, regardless of the frequency or intensity ratings, was used to determine the prevalence of each visual symptom between the groups. A Fisher's exact test was used to compare prevalence of each item between the control group and the neck pain group. Further, the product of the intensity (0–4) and frequency (0–3) rating for each item was generated to investigate the magnitude of each visual complaint (0–12). The magnitude (/12) of each of the visual complaints was compared between the control and neck pain group using a Mann–Whitney U test as data normality was not found. The sum of the magnitude (/12) of each of the visual complaints, excluding those where there was no difference between the control and neck pain group was also produced to give an overall visual complaints index (VCI) for each participant. The neck pain group was then subdivided into those with whiplash associated disorder (WAD) and those with idiopathic neck pain (INP) and the prevalence and magnitude of each symptom as well as the total VCI scores were compared between the control and neck pain group as well as the INP and WAD groups using Mann–Whitney U tests. Spearman's ρ was calculated to investigate the relationship between the VCI scores and age, the NDI and the DHIsf in the neck pain group. The IBM SPSS statistical program (version 20) was used for all calculations. Level of significance was set at $P < 0.05$.

Table 1

Comparison of demographic and questionnaire data (mean and standard deviation or %) between asymptomatic control and subjects with neck pain.

	Control <i>n</i> = 70	Neck pain <i>n</i> = 70
Age (years)	31.0 (12)	31.2 (11)
Gender (% females)	70	71
Glasses/contact use (%)	40	41
Neck Disability Index (%)	–	34.4 (20)
Dizziness handicap inventory – short form (/13)	12.8 (5)	8.5 (4)
Visual complaint index (/168)	6.2 (9)	27.4 (25) ^a

^a Significant difference between control and neck pain groups $P < 0.05$.

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