



Original article

Identifying prognostic factors predicting outcome in patients with chronic neck pain after multimodal treatment: A retrospective study



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ABSTRACT

Objectives: This study was conducted to identify possible prognostic factors to predict drop-out and favorable outcome in patients following a multimodal treatment program at an outpatient rehabilitation clinic.

Methods: A retrospective cohort study was conducted on 437 patients with chronic neck pain involved in an exercise-based rehabilitation program of an outpatient rehabilitation center between January 2008 and November 2011. Prognostic factors were analyzed through a univariate and a multivariate logistic regression analysis.

Results: Multivariate logistic regression revealed that a higher age (OR = 0.960), presence of headache (OR = 0.436) or low back pain (OR = 0.525), and having low levels of depression (OR = 1.044) increase the odds to complete the multimodal treatment program. A high NDI-score (OR = 0.945), a high NRS-score for pain in the upper extremities (OR = 0.862), a low NRS score for pain in the neck (OR = 1.372), and a trauma in the patient's history (OR = 0.411) decrease the odds of having a favorable outcome after the given treatment program.

Conclusion: It is important to assess these prognostic factors as they may help therapists to identify patients with a good prognosis or patients at risk. For those at risk, this would allow the treatment approach to be redirected to address their specific needs.

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1. Introduction

Neck pain is a common and disabling health problem with up to 70% of individuals experiencing an episode in their lifetime (Fejer et al., 2006). Acute neck pain is most often resolved in a few days, however the estimated rate of recurrent and persisting symptoms is relatively high (Carroll et al., 2009). The prevalence of chronic neck pain is increasing, with an increase in socio-economic burden (Hoy et al., 2010). Longitudinal studies suggest that about one-third of those who experience neck pain will develop chronic symptoms, and chronic patients consume the largest share of treatment

resources, accounting for most of neck pain-related health care costs (Carroll et al., 2009; Hoy et al., 2010).

Primary care referral to physiotherapy is a widely adopted treatment option for patients with chronic neck pain, and the best evidence suggests that therapies involving exercise and manual therapy are more effective than other conservative approaches to neck pain (Kay et al., 2005; Miller et al., 2010). Exercise-based physiotherapy is a widespread clinical approach, but exercise protocols may be very different in each clinical setting.

While several high quality studies have explored risk factors for developing chronic neck pain, research on the predictors of treatment outcome is less available. Some studies have found considerable heterogeneity among study populations with pain and it has been suggested that patient pre-treatment characteristics could predict specific subgroups of patients who will benefit most from specific interventions (Bergström et al., 2012; Gustavsson et al., 2013). Tailoring a treatment according to the patient's characteristics would serve to optimize treatment gains. Simultaneously,

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early targeting of patients at risk for non-recovery who may need more complex and second level approaches may be required.

The aim of the present study was to determine prognostic factors for outcome of a multimodal program (favorable versus unfavorable outcome) and prognostic factors for the adherence to therapy (drop-out versus adherence to therapy) in patients with chronic neck pain in an outpatient rehabilitation clinic.

2. Methods

2.1. Subjects

A retrospective study was conducted on 437 patients with chronic neck pain involved in an exercise-based rehabilitation program of an outpatient rehabilitation center between January 2008 and November 2011. A physician referred patients to that program based on their medical examination and medical record. Patients who needed urgent surgery were excluded. Ethical approval was received from the local ethical committee.

2.2. Intervention

The Rehabilitation Center is a clinic that focuses on outpatient treatment of patients with chronic spinal pain. The aim of the rehabilitation is to improve the patients' functional capacity, reduce the pain, and increase the patients' knowledge on pain management, ergonomics and coping strategies. Although the treatment program is to some extent individualized, the standard schedule includes 36 sessions exercise and therapeutic activities for 2 h in every session, over a 24-week period. At the start of the exercise sessions, five theoretical sessions were organized consisting of back school education. This was followed by a first set of exercise sessions directed at enhancing mobility, cervico-thoracic stability, endurance and force with increasing difficulty and intensity (Beernaert et al., 2006; Cagnie et al., 2008). This was combined with a cardiovascular reconditioning program. The last 12 sessions consisted of functional exercises individually adapted according to the patients' daily activities (Cagnie et al., 2008).

2.3. Predictors

Potential prognostic indicators were derived from the data of the medical examination, and questionnaires. Since evidence suggests that self-reported constructs are stronger predictors than clinical signs, no physical signs were included in this cohort study (Verhagen et al., 2010; Walton et al., 2013). Data retained from the medical examination were: age, sex, body mass index (BMI), comorbid pain (headache, lumbar pain, fibromyalgia, and thoracic pain), working status, level of physical activity, duration of symptoms, previous and present treatment and/or medication intake for neck pain, and self-reported information on whether or not the pain condition was related to an accident.

The following questionnaires were included: The Neck Disability Index (NDI), the Tampa Scale for Kinesiophobia (TSK), and the Beck Depression Index (BDI).

The NDI assesses the degree of disability on a 50-point scale. It consists of 10 questions assessing pain intensity, personal care, lifting, sleep, driving, sex life, headache, concentration, reading, and work. These items are scored on a 6-point scale (0–5). A higher score indicates a greater degree of disability (Vernon, 2008). The TSK is a valid and reliable instrument existing of 17 questions used for the assessment of fear of movement (kinesiophobia) (Lundberg et al., 2004; Bunketorp et al., 2005; Lundberg et al., 2009). Scores range from 17 to 68, with a higher score indicating an increased degree of kinesiophobia (Pool et al., 2009). The BDI is a 21-items

scale used for the evaluation of cognitive, behavioral and somatic symptoms of depression. A higher score indicates that more depressive symptoms are present (Beck et al., 1961).

The average pain intensity over the last seven days was assessed on an 11-point numeric rating scale (NRS-11), where 0 represents “no pain at all” and 10 “the worst possible pain” for both the neck region and upper extremities (Hjermstad et al., 2011).

2.4. Outcome

Patients who attended less than 70% of the treatment program were assigned as dropouts. Outcome after the given treatment was defined at the end of the treatment program. The reported minimal clinically important difference was based on the NDI and NRS-11. A 30% reduction in NDI score compared with baseline, and a 30% reduction in patient's global rating of their neck pain (NRS-11) were chosen as cut-off values (Ostelo et al., 2008). If both criteria were met, patients were assigned to the ‘favorable outcome’ group. If there was no reduction in pain and disability of at least 30%, patients were assigned to the ‘unfavorable outcome’ group.

2.5. Statistical analyses

Potential predicting factors were chosen based on the result of the independent t-test for continuous variables and the Chi-Square (χ^2) for categorical variables. All variables in the univariate analysis with a p-value < 0.10 were entered into a logistic regression model (Freedman and Freedman, 1983). To identify factors predicting outcome, two separate binary logistic regression models were constructed to differentiate between (1) dropouts and stayers and (2) favorable and unfavorable outcome. A multivariate analysis was carried out in which all potential predictors were included. Estimates of association are presented as odds ratios (ORs), along with 95% confidence intervals.

Logistic regression models were built by removing one variable at a time (Backward LR Selection), with the criteria of removing the variables with the highest p-value, until all variables had a p-value less than 0.05 (Field, 2013). Logistic regression was based on the likelihood-ratio (Menard, 2002; Field, 2013). For explained variance, the standard routine of pseudo R^2 , Nagelkerke's R^2 , was applied. The Hosmer–Lemeshow test was performed to assess how well the model fits the data (Field, 2013). Statistical analyses were carried out using SPSS v.22.0.

3. Results

3.1. Patient characteristics

The mean age of the population was 43.32 (± 10.56) years. About 80.3% of our population consisted of woman. The average NDI was 18.52 (± 6.81), which reflects a moderate disability. The mean BDI was 14.19 (± 9.11), which is an indication for the presence of mild mood disturbances to borderline clinical depression. Lastly, mild kinesiophobic symptoms were present in this population as the average TSK was 37.32 (± 6.62). Forty-two patients were excluded for the multivariate analysis due to missing data. Summary data were presented as numbers and percentages for categories of favorable outcome, unfavorable outcome, and drop-outs in Table 1.

3.2. Univariate analysis

A total of 12 possible prognostic factors, based on the results of the univariate analysis, were included in the multivariate analysis.

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