



PROGNOSTIC FACTORS FOR RECURRENCES IN NECK PAIN PATIENTS UP TO 1 YEAR AFTER CHIROPRACTIC CARE

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ABSTRACT

Objective: Information about recurrence and prognostic factors is important for patients and practitioners to set realistic expectations about the chances of full recovery and to reduce patient anxiety and uncertainty. Therefore, the purpose of this study was to assess recurrence and prognostic factors for neck pain in a chiropractic patient population at 1 year from the start of the current episode.

Methods: Within a prospective cohort study, 642 neck pain patients were recruited by chiropractors in Switzerland. After a course of chiropractic therapy, patients were followed up for 1 year regarding recurrence of neck pain. A logistic regression analysis was used to assess prognostic factors for recurrent neck pain. The independent variables age, pain medication usage, sex, work status, duration of complaint, previous episodes of neck pain and trauma onset, numerical rating scale, and Bournemouth questionnaire for neck pain were analyzed. Prognostic factors that have been identified in previous studies to influence recovery of neck pain are psychologic distress, poor general health at baseline, and a previous history of pain elsewhere.

Results: Five hundred forty five patients (341 females), with a mean age of 42.1 years (SD, 13.1) completed the 1-year follow-up period. Fifty-four participants (11%) were identified as “recurrent.” Prognostic factors associated with recurrent neck pain were previous episodes of neck pain and increasing age.

Conclusion: The results of this study suggest that recurrence of neck pain within 1 year after chiropractic intervention in Swiss chiropractic patients presenting from varied onsets is low. This study found preliminary findings that older age and a previous episode of neck may be useful predictors of neck pain recurrence within 1 year. (*J Manipulative Physiol Ther* 2015;38:458-464)

Key Indexing Terms: Neck Pain; Recurrence; Chiropractic; Forecasting

Neck pain is a common reason for patients seeking health care.¹ Most people will see a medical practitioner or another health care provider at least once in their lifetime due to neck pain.² Those who have

experienced an episode of neck pain are likely to have another onset within the next 1 to 5 years.³ Consequently, The Neck Pain Task Force has described neck pain as an episodic occurrence over one’s lifetime with variable

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degrees of recovery between episodes.² Hush et al⁴ reported that a new episode of neck pain appears to recover during the acute phase. Nevertheless, the prognosis for a complete recovery is quite poor.⁴ In an observational study, it was shown that patients with a new episode of neck pain in primary care setting typically have high pain scores that improve rapidly during the 3 months after treatment. However, those who do not recover within the 3 months after the intervention have reported relatively low residual pain and disability.⁵

There are known prognostic factors for the onset of neck pain such as computer work, heavy physical work, psychosocial variables, psychologic variables (eg, catastrophizing and kinesiophobia), duration of complaint, age, sex, and previous neck injury.⁶⁻¹¹ Although several previous studies have made observations regarding neck pain (onset/recovery), no studies prospectively attempted to determine prognostic factors for recurrence of neck pain as a primary outcome.

Information about the possible development of the condition is crucial in shaping patients' expectations about recovery.⁵ It is important that a neck pain patient knows what to expect after a chiropractic treatment and for the therapist to be able to distinguish those with neck pain who will recover and those who will not.

The first purpose of this study was to assess the number of episodes of self-reported recurrences over a 1-year period. The second purpose was to identify prognostic factors for the recurrence of neck pain after a chiropractic intervention.

METHODS

Study Sample

Patients with neck pain of any duration age older than 18 years, who had not undergone chiropractic care or manual therapy within the previous 3 months, and agreed to participate were included in the study. Patients were excluded if they had signs of severe pathology of the cervical spine that are contraindications for chiropractic manipulative treatment such as tumor, severe trauma, acute inflammation, rheumatic conditions, and any signs of possible adverse events, for example, cervical artery dysfunction.

All members of the Association of Swiss Chiropractors (Chirosuisse) were invited to participate by recruiting patients. Each chiropractor received notifications, instructions, and the study protocol by e-mail. Patients who were deemed eligible for the study were given, by the individual practice secretaries, the information on participating and the informed consent form to sign. All data from those who consented to participate were sent to a secure fax machine at the Department of Chiropractic Medicine, University Hospital of Balgrist. The participating chiropractors were asked to provide normal and usual treatment for their neck pain patients. No efforts were made to standardize the treatment or the number of treatments. It is known from a

study done by Humphreys et al¹² and a recent article by Bryans et al¹³ that chiropractic treatment is diversified. Commonly used techniques are spinal manipulation, trigger point therapy, therapeutic exercises, mobilization techniques, and advice on the activities of daily living.^{12,13} The attending chiropractor was not informed if any of their patients withdrew from the study. Ethics approval was obtained from the Canton of Zurich, Switzerland Ethics Committee (EK-19/2009), and written informed consent was obtained from all participants.

Study Design

This study conducted a secondary analysis of prospectively collected data that were gathered during another research project with a 1-year follow-up.¹⁴ Before the start of the study, a literature search was conducted to identify relevant articles. The following databases were checked for relevant article: Medline, CINAHL, Embase, Cochrane, and PEDro. The key terms were neck pain, prognostic factor(s), and recurrence. These were used as single terms and then linked. The identified abstracts were then screened for eligibility. None of the articles was found to match the aim of the article.

At baseline, the following variables were collected: age, sex, work status, traumatic onset, duration of complaint, previous episodes, and the use of pain medication. In addition, the Bournemouth questionnaire for neck pain (BQN) and the numeric rating scale (NRS) were used. The BQN is a short form, multidimensional questionnaire that was developed on the biopsychosocial model. The BQN includes 7 items on psychosocial issues as well as pain intensity and physical disability.^{15,16} The NRS is an 11-point rating scale to assess the patient's perception of pain intensity. It ranges from 0 ("no pain at all") to 10 (the worst imaginable pain).¹⁷ To score the questionnaire, the individual items were added up for a total score of 70. A higher score reflects more psychosocial complaints related to the neck pain experience.^{18,19}

The patient data were collected at baseline, 3, 6, and 12 months after the initial treatment. Trained research assistants using a standardized script called each patient by telephone at the appointed data collection time. The following definition of recurrence was used to quantify participants as recurrent: recurrent neck pain is defined as pain that occurred at least 2 times over the past year with each episode of neck pain lasting at least 24 hours, with a pain intensity of greater than 2 on an 11-point NRS and at least a 30 day pain-free episode between episodes.²⁰

In addition, patients were deemed to be "recurrent" if they were attending additional treatment for their neck pain such as acupuncture, physiotherapy, osteopathy, or surgery. This was the primary outcome measure. Patients were deemed to be "nonrecurrent" if they reported no new episodes of neck pain. If a patient withdrew from the study, the associated data set was marked.

Database

The database for this study was formulated, structured, and categories were identified before the start of the study. Research assistants not involved in the study checked the database as well as the informed consent. A quality assurance check of the data was done at different intervals by both the assistant that entered the data as well as by another research assistant who was not involved in the data entry. They both independently checked the accuracy of the data compared with the original questionnaires. During the time the study was conducted, all participants' files were stored and locked in a secure room, to which only the research assistants had access. The files of participants who dropped out of the study were removed, stored, and locked away. Only the principal investigator had access to them.

Statistical Analysis

The data were stored and analyzed using the IBM SPSS 21 statistical software package (SPSS, Inc, Chicago, IL). Descriptive statistics were used to describe patient characteristics. Logistic regression (stepwise: backward) was applied to test prognostic factors for recurrent neck pain. The dichotomous dependent variable was coded as 0, nonrecurrent; and 1, recurrent. The independent variables were dichotomized and included age (0, below 45; 1, above 45), use of pain medication (no, 0; yes, 1), sex (male, 0; female, 1), work status (not working, 0; working, 1), duration of complaint (0, acute/subacute up to 90 days; 1, chronic >90 days), previous episodes of neck pain (no, 0; yes, 1), and trauma onset (no, 0; yes, 1). As well, pain measured by using the NRS and disability measured by the BQN were 2 of the independent variables.

All variables were checked for correlation before they were entered into the model. In the case of correlation between variables ($r > 0.20$), one of the correlating variables was selected for the logistic regression based on fewer correlations with the other independent variables. The selection criterion for removal for the analysis was set at $\alpha = .05$, and $P < .05$ was considered significant.

To judge the quality of the model, a receiver operating characteristics curve was conducted. The area ranges from 0.5 to 1. 0.5 equals no discrimination; and 1, perfect discrimination.²¹

RESULTS

Study Sample

Of the 280 members of the ChiroSuisse Association from the 2 largest geographic regions (German and French), 29% participated in this study. A total of 642 patients were recruited, and 97 (15%) withdrew from the study during the 1-year follow-up. Five hundred forty-five neck pain patients (204 men and 341 women) provided complete data during the 1-year follow-up period. Of the 545 participants, the mean age was 42.1 years (SD, 13.1). At baseline, the mean NRS

Table. Baseline Characteristics of All Participants

Variable	Total (n = 545)
Age (y)	42.10 (SD, 13.10)
Age groups (y)	
18-29	98 (18.0%)
30-44	223 (40.9%)
45-59	156 (28.6%)
60-75	68 (12.5%)
Sex	
Male	204 (37.4%)
Female	341 (62.6%)
Duration of complaints	
Acute (<30 d)	242 (44.4%)
Subacute (>30-90 d)	110 (20.2%)
Chronic (>90 d)	193 (35.4%)
Profession	
Working	452 (82.9%)
Not working	93 (17.1%)
Pain medication	
No	372 (68.3%)
Yes	174 (31.7%)
Trauma onset	
No	469 (86.1%)
Yes	76 (13.9%)
Previous episodes	
No	231 (42.4%)
Yes	314 (57.6%)
NRS	5.67 (SD, 2.19)
BQN	30.92 (SD, 14.82)

BQN, Bournemouth Questionnaire for neck pain; NRS, numeric rating scale.

score for pain intensity was 5.67 (SD, 2.19) and the mean total score for the BQN was 30.92 (SD, 14.82). Thirty-two participants stated during follow-up that they no longer want to participate. Five, 1 week after the initial treatment; 6, after 1 month; 9 at 3 months; 12 at 6 months; and 2 at 12 months. Two participants could not be recontacted. See the Table for a more detailed account of the baseline sociodemographic and clinical characteristics of the participants.

Recurrence of Neck Pain Complaint

At 1 year after treatment, a total of 491 participants were classified as "nonrecurrent," as they had not experienced a new episode of neck pain. Fifty-four (11%) patients were identified as "recurrent" of which 33 began another treatment (physiotherapy, osteopathy, and acupuncture), and 6 patients underwent surgery.

Prognostic Factors for Recurrence of Neck Pain

Nine independent variables were entered into the model, namely age, use of pain medication, sex, work status, duration of complaint, previous episodes of neck pain, trauma onset, NRS, and BQN. The logistic regression model with recurrence as the dependent variable (0, nonrecurrent; 1, recurrence) revealed age (odds ratio, 2.310; $P = .004$; confidence interval,

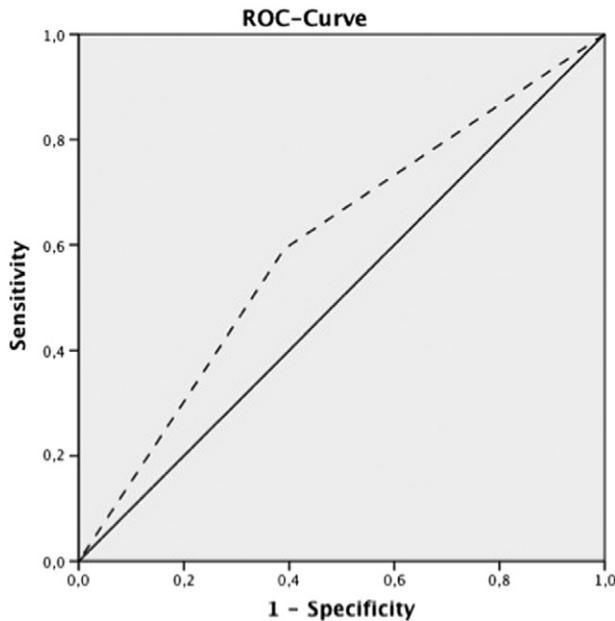


Fig 1. Receiver operating characteristics curve age older than 45 years (0.601).

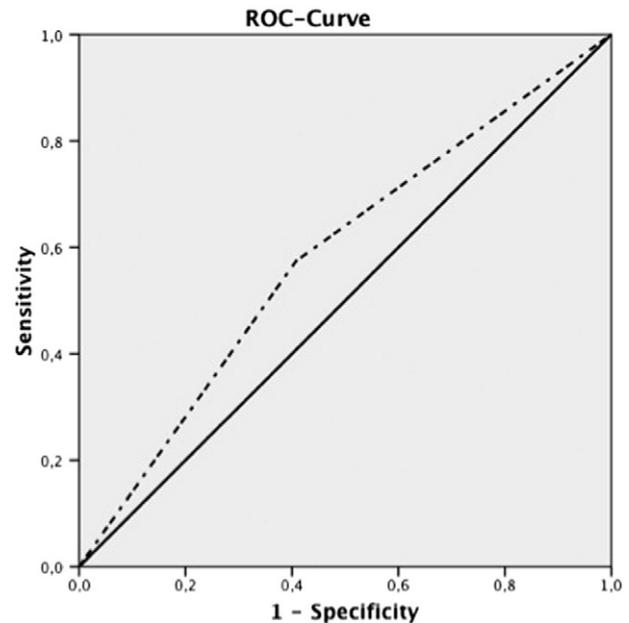


Fig 2. Receiver operating characteristics curve previous episodes (0.583).

1.299-4.108) and a previous history of neck pain (odds ratio, 0.503; $P = .019$; confidence interval, 0.284-0.893) as statistically significant risk factors (Nagelkerke, 0.05). An increase in age was associated with recurrence. Patients older than 45 years are twice as likely to experience a neck pain recurrence within 1 year after the start of chiropractic treatment. If a participant did not experience an episode of neck pain before, the risk of recurrence reduced 0.503. The area under the curve analysis (Figs 1 and 2) showed that the full multivariable model is not able to discriminate well.²²

DISCUSSION

Information about recurrence and prognostic is important for patients and practitioners to set realistic expectations about the chances of a full recovery and to reduce patient anxiety and uncertainty.

Recurrence of Neck Pain Complaint

The results of this study revealed that 89% of neck pain patients had recovered from their neck pain episode up to 1 year after receiving chiropractic care. Therefore, 11% of patients reported a new episode or recurrence of their neck pain or had the need for an additional neck pain intervention. Although an age of older than 45 years and a series of previous complaints were labeled as a significant prognostic factor during the statistical analyses, the Nagelkerke of 0.05 and the receiver operating characteristics curve of 0.601 and 0.583 revealed that the model is overall a poor predictor of the individual's risk of recurrence. Because of the fact that, in a literature search, no other study could be identified that

focused on recurrence as a primary outcome, studies that worked with recovery and the clinical course of recovery are used to integrate our findings into recent research. In the study by Leaver et al⁵ that focused the clinical course of a new episode of neck pain and on clinical factors that are associated with faster recovery rates, 22% of the participants included reported recurrences of their neck pain at 3 months.⁵ There are differences in these 2 studies, which make it difficult to compare the outcomes. First of all, Leaver et al⁵ focused not on recurrence as a primary outcome. They included patients with a new episode of neck pain of less than 3 months' duration that was preceded by at least 4 weeks without complaints. There was no clear definition of the problems being either acute or chronic, and they did not dichotomize the participants into acute or chronic. We chose to include participants with any duration of neck pain and subgrouped them. Another key point in our study was that participants did not have had any treatment in the previous 3 months by a chiropractor or physical therapist. In the study of Leaver et al⁵, the patients received either physical therapy or chiropractic at 4 treatment sessions over 2 weeks. During each session, patients received manual therapy that could have been a high-velocity thrust manipulation or mobilization. The selection of treatment methods was at the discretion of the treating therapist. In addition, they received exercises, advice about activity, and electrotherapy. In the current study, only chiropractic care was given that typically would include spinal manipulation, advice on the activities of daily living, trigger point therapy, therapeutic exercises, and mobilization techniques.¹² The type of intervention was not standardized, although normal and usual chiropractic care was applied, which in our opinion, reflects the reality of daily chiropractic practice.

Prognostic Factors for Recurrence of Neck Pain

Age and a previous episode of neck pain were found to be prognostic factors for recurrence using logistic regression. However, we have to point out that also, these 2 variables were significant; however, further statistical analyses revealed that, overall, the model is a poor predictor. In particular, Croft et al⁸ showed that previous episodes of neck pain are prognostic factors for recurrence of another neck pain episode,⁸ and Leaver et al⁵ and Croft et al⁸ found that increasing age leads to a higher risk of recurrence. Although it is tempting to explain the relationship based on increased spinal degeneration with increasing age, however, the research literature is equivocal on this issue.²³⁻²⁶ More research is needed to understand the likely reasons for age as a predictor for recurrence of neck pain. On the other hand, factors such as injury^{8,27,28} and female sex^{6,8,11} could not be confirmed, although the literature shows that women are more likely to develop neck pain problems.^{6,8,11,29} Furthermore, women have twice the prevalence and incidence for nonspecific neck pain compared with males.³⁰ However, this did not appear to influence the recurrence rate in the present study, although most of our participants were female (62.7%). Neck injury has also been connected with the onset of neck pain,^{7,8,28} although our study could not find a relationship between a previous neck injury and recurrence of neck pain. One reason for this could be the small number of patients in our study with a previous neck injury (13.9%). Croft et al⁸ used a different approach to investigate this issue using a longitudinal survey design. Participants were only included if they were free of any neck pain at the start and surveyed again after 1 year.⁸ Of the total number of 1708 participants, 305 (17.8%) reported neck pain within the previous year, and 104 of these recalled a prior injury.⁸ We cannot make a direct comparison, as our participants started with neck pain and were treated for this complaint.

An additional factor that is mentioned in the literature is duration of complaint.^{31,32} Rubinstein et al³¹ used the same inclusion and exclusion criteria as this current study, but they were focused on identifying predictors of a favorable outcome, not prognostic factors for a recurrence. Rubinstein et al³¹ state that subjects who have less than 30 days of neck pain are more likely to recover compared with patients with a duration of complaint more than 60 days. A previous study done by Peterson et al¹⁴ focusing on the predictors of "improvement" revealed that acute patients have higher pain levels and disability before treatment but improve quicker than chronic patients.¹⁴ That study worked with time points at 1 week, 1 month, and 3 months and focused on "improvement" using the Patient's Global Impression of Change scale.¹⁴ Using the same patients from that database, this current study used a follow-up period of 12 months but focused only on whether the patients reported recurrences of their neck pain or were recovered. The results of this current study were not able to confirm that the duration of complaints before the first treatment influenced the onset of new episodes of neck pain. However, this could be caused by the duration of the

follow-up; it might have been too short to include patients who had a recurrence more than 12 months after finishing the study. Kjellman et al³² focused on prognostic factors for perceived pain and function, and they found that duration of the current complaint was a prognostic factor for neck pain recurrence at the 12-month follow-up time.³² However, there are a number of differences compared with our study. In particular, Kjellman et al³² compared different treatment settings. One hundred twenty-three participants were recruited at physiotherapy units to which they had been referred. The second group of 70 patients was recruited during a randomized controlled trial that compared physiotherapy and chiropractic.³² The patients participating in the randomized controlled trial did not have any treatment during the month before the start of the study. However, that rule was not applied to the patients recruited by the physiotherapy units.³² In our opinion, that could have influenced the outcome, because 2 different study samples were used. Our study sample only included participants who had not undergone manual therapy treatment or chiropractic treatment previously and therefore make the outcome more generalizable. Consequently, caution should be used in comparing the study of Kjellmann et al³² with the present one because of the different treatment and baseline settings.

It is clear that much more standardized research is needed in this area. Identifying the likelihood of recurrences in neck pain patients as well as prognostic factors for recurrence is important for patients and practitioners. The results of this study revealed that recurrence of another episode of neck pain within a year after the start of chiropractic care is low. However, having had a previous episode as well as increasing age is increased risk factors for predicting a subsequent new episode of neck pain within a year. This information may help patients understand and reduce their fear or anxiety related to their neck pain condition and help them recover by providing realistic information about their chance of a full recovery.^{5,29-31,33-35}

Limitations

There are limitations to the generalizability of our study. Ninety-seven patients (15%) withdrew from the study. We do not know if the dropout group was representative of the remaining participants. Of the remaining patients, 89% showed no recurrence, and this imbalanced group size could have influenced the logistic regression analysis.³³ Psychologic factors are also known to influence the recovery of pain patients.^{3,5,8,10} However, we did not analyze this for the current study. In addition, it would be reasonable to analyze the data with a more differentiated subgrouping, for example, (1) chronic patients who did not seek additional care and (2) chronic patients who did seek additional care. Those patients may not necessarily be recurrent because they may have a persistent neck problem. Because of the limiting factors of the study, a confirmatory study is required.

CONCLUSION

The results of this study suggest that recurrence of neck pain within 1 year after chiropractic intervention in Swiss chiropractic patients presenting from varied onsets is low. It provides a better understanding of recurrent neck pain as well as prognostic risk factors for a subsequent episode of neck pain. Older age and a previous episode of neck may be useful predictors of neck pain recurrence within 1 year; however, additional studies are needed.

FUNDING SOURCES AND POTENTIAL CONFLICTS OF INTEREST

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CONTRIBUTIONSHIP INFORMATION

Concept development (provided idea for the research): C.K.P., B.K.H.

Design (planned the methods to generate the results): C.K.P., B.K.H.

Supervision (provided oversight, responsible for organization and implementation, and writing of the manuscript): C.K.P., B.K.H., J.S., A.L.

Data collection/processing (responsible for experiments, patient management, organization, or reporting data): C.K.P., B.K.H., J.S., A.L.

Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): J.S., A.L.

Literature search (performed the literature search): A.L.

Writing (responsible for writing a substantive part of the manuscript): A.L., J.S.

Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): C.K.P., B.K.H., J.S., A.L.

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Practical Applications

- This study found that neck pain recurrence was reported by 11% of chiropractic patients at the 1-year follow-up.
- Age and previous neck pain were associated with neck pain recurrence at 1 year.
- Prognostic information is important for patients and practitioners.

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