Course and prognosis of shoulder symptoms in general practice

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Objectives. To investigate the course and prognosis of shoulder pain in the first 6 months after presentation to the general practitioner. We separately studied patients with acute, subacute and chronic shoulder pain, as duration of symptoms at presentation has been shown to be the strongest predictor of outcome.

Methods. A prospective cohort study with 6 months follow-up was carried out in The Netherlands, including 587 patients with a new episode of shoulder pain. Patients were categorized as having acute (symptoms <6 weeks), subacute (6–12 weeks) or chronic (>3 months) shoulder pain. The course of shoulder pain, functional disability and quality of life was analysed over 6 months. Patient and disease characteristics, including physical and psychosocial factors, were investigated as possible predictors of outcome using multivariable regression analyses.

Results. Acute shoulder symptoms showed the most favourable course over 6 months follow-up, with larger pain reduction and improvement of functional disability. Patients with chronic shoulder symptoms showed the poorest results. The multivariable regression analysis showed that predictors of a better outcome at 6 months for acute shoulder pain were lower baseline disability scores and higher baseline pain intensity (explained variance 46%). Predictors of a better outcome for chronic shoulder pain were lower scores on pain catastrophizing and higher baseline pain intensity (explained variance 21%)

Conclusions. The results indicate that, besides a different course of symptoms in patients presenting with acute or chronic shoulder pain, predictors of outcome may also differ with psychosocial factors being more important in chronic shoulder pain.

KeY WORDS: Shoulder pain, Disability, Psychosocial factors, General practice, Course, Prognosis, Prospective cohort study.

Introduction

Shoulder symptoms are a frequent problem in general practice, affecting between 7% and 34% of adults at any one time [1]. Not everyone consults the general practitioner (GP) for these symptoms. The annual consulting incidence in Dutch general practice for shoulder symptoms is estimated between 12 and 25/1000 persons-years [2–5]. Little is known about the pathophysiology and aetiology of shoulder disorders, although associations with obesity, age, female gender, physical work load and psychosocial factors have been proposed [6–8].

Various studies have contradicted the belief that shoulder pain is a benign and self-limiting problem. Only around 50% of all new episodes of shoulder pain presented in primary care show complete recovery within 6 months, while after 1 yr this proportion increases to only 60% [9–12]. In the period 1987–95, the state of Washington (USA) each year accepted over 6000 work disability claims related to shoulder problems [13]. Information about the clinical course of shoulder symptoms after presentation in general practice is still limited. The medical literature on shoulder disorders is predominantly based on hospital surveys, although only a small proportion of shoulder patients in general practice (≤8%) are referred for a specialist opinion [10]. Yet, knowledge on the course may facilitate treatment decisions and may help to inform patients about their prognosis. Several prospective cohort studies have investigated neck, shoulder or upper limb problems in primary care populations [9–12, 14–17]. The following factors were repeatedly identified as potential predictors of outcome: long duration of symptoms at baseline [10, 12, 15–17], more intense pain [15, 16], history of symptoms [9, 12, 15–17], musculoskeletal pain elsewhere [15, 17] and psychosocial factors [12, 16, 17].

The aim of our study was to investigate the course of shoulder symptoms during the first 6 months after visiting the GP, in terms of pain, functional disability and quality of life. We made a distinction between patients with acute shoulder pain (duration of symptoms <6 weeks before consulting the GP), subacute shoulder pain (duration of symptoms between 6 and 12 weeks) and patients with chronic shoulder pain (duration of symptoms at least 3 months), as foregoing research showed that symptom duration is an important predictor of outcome, with acute shoulder pain having a better prognosis than chronic pain. The questions we addressed in our study were:

(1) What is the course of shoulder symptoms during the first 6 months after visiting the GP, in terms of pain, functional disability and quality of life?
(2) Is the prognosis different in patients with acute, subacute and chronic shoulder pain at consultation?
(3) What are predictors of a better outcome after 6 months in patients presenting with either acute or chronic shoulder pain?

Methods

Study population

This study is based on the results of a cohort study that was performed in 103 general practices in three geographical regions in The Netherlands (Amsterdams, Groningen and Maastricht) [18]. Patients were selected if they were ≥18 yrs, and had not consulted their GP or received any form of treatment for the afflicted shoulder in the preceding 3 months. Shoulder pain was characterized as pain in the deltoid and upper arm region, provoked or increased by movement in the shoulder joint. GPs were instructed to select consecutive patients. Sufficient knowledge of the Dutch language was required to complete written questionnaires. Exclusion criteria were acute trauma or systemic, physical or psychological conditions (i.e. fractures or luxation in the shoulder region; rheumatic disease; neoplasm; neurological or vascular disorders; dementia).

Design

The GP informed the patients about the study, after which written consent was obtained according to the Declaration of Helsinki.
The GP started treatment according to national Dutch guidelines for shoulder pain, which advise a stepwise approach (advice, medication, steroid injection or physiotherapy) in which the next treatment option is only considered for patients returning with persistent pain and disability [19]. Information was recorded about the treatment provided to the patients at the first consultation. Within 10 days after the consultation a baseline assessment was performed, consisting of a patient history, standardized physical examination and a questionnaire. A second questionnaire (first follow-up) was sent after 6 weeks, the third questionnaire (second follow-up) after 3 months and the fourth questionnaire (third follow-up) after 6 months. The study was approved by the Medical Ethics Committee of the VU University Medical Centre in Amsterdam.

**Outcome measures and potential prognostic factors**

In each questionnaire, the intensity of shoulder pain, functional disability and quality of life was measured. Pain was recorded by the patient on a numeric rating scale (0–10 points, 0 = no pain; 10 = very severe pain). Functional disability was measured using the 16-item Shoulder Disability Questionnaire (SDQ; 0–100) [20]. Quality of life was measured by the EuroQol (EQ-5D; 0–1) [21, 22], covering five domains: mobility, self-care, usual activities, pain/discomfort and anxiety/depression.

During the baseline assessment information was collected on a variety of potential prognostic factors. Sociodemographic variables included age, gender, educational level and work status. Characteristics of the shoulder pain problem included intensity of pain, an acute or gradual onset, previous episodes of shoulder pain and whether or not the dominant side was affected. The questionnaire also included questions on co-existing musculoskeletal pain at the neck, back and upper extremities.

Causes of shoulder pain as perceived by the patient were categorized as unexpected movement, overuse due to unusual activities, overuse due to usual activities, accident or sports injury and were measured with questions answered by yes or no.

Physical activity was measured with a single question (less/ equally/ more active than others). We measured physical workload with a self-constructed scale of five questions (yes/no) concerning pushing and pulling, lifting weights, working with hands above shoulder level and the use of vibrating tools on at least 2 days a week (0–5). Repetitive movements, on at least 2 days a week, were measured with a single question answered with yes or no. The psychosocial work environment was assessed using the 27-item Job Content Questionnaire which measures all dimensions of the Job–Content–Support model [23].

Psychological factors were measured with widely used standardized questionnaires. Coping was assessed with the 43-item Pain Coping and Cognition List (PCCL) [24], consisting of the subdomains catastrophizing (1–6), coping with pain (1–6), internal (1–6) and external locus of control (1–6).

Anxiety (0–24), depression (0–12), somatization (0–32) and distress (0–32), were measured with the 50-item Four-Dimensional Symptoms Questionnaire (4DSQ) [25, 26].

The questionnaire finally included a general one-item question regarding the presence (yes/no) of any psychological problems (e.g. worries, depressive symptoms, anxiety).

**Analysis**

Descriptive statistics were used to summarize characteristics of the study population. We present this information separately for patients with acute, subacute and chronic shoulder pain. The course of symptoms in terms of pain, disability and quality of life was also described separately for these three subgroups by plotting the mean scores at each point in time. Next, we analysed potential predictors of outcome separately for patients with acute and chronic shoulder pain. Absolute change in pain intensity between baseline and 6 months follow-up was used as outcome measure.

Predictors were selected based on evidence from the literature on their potential predictive value in patients with musculoskeletal pain (age, history of pain, dominant side affected, musculoskeletal pain elsewhere, work load factors and pain catastrophizing) [9, 10, 12, 14–17, 27]. Another reason for selecting a potential predictor could be differences between patients with acute and chronic pain at baseline, indicating potential predictive importance of the factor.

Univariable linear regression analyses were performed to examine the relationship between each of the potential predictors and change in pain intensity after 6 months. Predictors measured on a continuous (e.g. age) or interval scale (e.g. baseline pain intensity) were entered as continuous variables, which provides an estimate of the mean reduction in pain for each point increase on the scale. If a continuous variable showed a non-linear association with outcome it was dichotomized or divided into tertiles (low, medium, high scores). This was the case for external locus of control and somatization.

Subsequently, predictors that were associated with the outcome (P < 0.30) were included simultaneously in a multiple linear regression model. Using a manual backward selection procedure, we sequentially excluded predictors with the lowest predictive value from the model until all predictors were significantly associated with outcome (Wald statistic P < 0.10) and further elimination resulted in a large deterioration of the explained variance of the model. The percentage of explained variance (R²) was calculated to give an indication of the predictive power of the final models.

**Results**

**Study population and follow-up**

At baseline, 587 patients were interviewed and physically examined. At 6 weeks 487 (83%), at 3 months 517 (88%) and at 6 months 538 (92%) patients returned the postal questionnaire. The drop-outs at 6 weeks and 6 months were significantly younger than the responders (mean difference 4 yrs and 6 yrs, respectively). Additionally, drop-outs at 6 months more often showed an acute onset (49 vs 36%), and less repetitive movements in their work (26 vs 36%) in comparison with the responders.

Table 1 lists the baseline characteristics of the participants separately for those with acute, subacute or chronic pain at baseline. The results show that patients with chronic shoulder pain reported higher pain intensity, more disability, had a higher somatization score, and more often reported a gradual onset of their shoulder pain compared with patients with subacute or acute shoulder pain. Patients with acute shoulder pain more often had a paid job, and slightly higher scores on external locus of control compared with those with subacute or chronic shoulder pain. These six factors were considered as potential predictors of outcome in further analyses (in addition to factors suggested by the literature).

**Management of shoulder pain**

At baseline, most patients (n = 451, 77%) received a wait-and-see policy, paracetamol or an NSAID. Furthermore, 68 patients (12%) received an injection with a corticosteroid, 58 patients (10%) were referred for physiotherapy and 11 (2%) received other therapies. Table 2 lists the management of shoulder pain of the participants separately for those with acute, subacute or chronic pain at baseline.

The proportion of patients receiving wait-and-see policy, paracetamol or NSAIDs was higher in patients with acute shoulder pain compared with those with chronic shoulder pain, while the proportion of physiotherapy referrals was higher in patients with chronic shoulder pain.
management of shoulder pain, especially in patients with chronic shoulder pain. Pain intensity, pain duration, and level of disability were higher in this group compared to those with acute or subacute pain.

**Predictors of change in pain intensity**

The results of the univariable regression analyses demonstrating the association of each putative predictor with change in pain intensity after 6 months are presented in Table 3, separately for patients with acute and chronic shoulder pain. Baseline shoulder disability, catastrophizing, somatization, paid work, baseline pain intensity, previous episode, gradual onset, repeated movements with arms or wrists and co-existing pain in the neck or upper extremities, were associated with change in pain intensity during follow-up in patients with acute shoulder pain at baseline. In those with chronic shoulder pain, baseline shoulder disability, age, pain catastrophizing, external locus of control, gradual onset and baseline pain intensity with chronic shoulder pain showed an univariable association ($P \leq 0.30$) with outcome. These variables were selected for the multivariable regression analyses.

Table 4 presents the variables included in the prediction models for persistent symptoms at 6 months after backward stepwise selection. Predictors of a better outcome at 6 months for acute shoulder pain were lower baseline disability scores and higher quality of life during follow-up. Mean scores were consistently lower among patients with chronic shoulder pain. For each outcome measure the differences between the three subgroups were statistically significant at each moment of follow-up.
baseline pain intensity. The model shows, for example, that with each point increase in baseline pain intensity (scale 0–10) the mean change in pain at 6 months increased by 0.84 points (95% CI 0.71, 0.98). The explained variance was 46% at 6 months. Predictors of a better outcome at 6 months for chronic shoulder pain were lower scores on pain catastrophizing and higher baseline pain intensity scores. The model explained 21% of the variance in pain reduction at 6 months.

Discussion
The results of our prospective cohort study showed a mean pain reduction of 70% among patients presenting with acute shoulder pain, compared with 54% in those with subacute symptoms and 44% in patients with chronic pain at baseline. The course of functional disability presented very similar patterns. There was little change in quality of life during follow-up. Prognostic factors partly differed between patients with acute/chronic shoulder pain.

Course of shoulder symptoms
In a previous study on neck and shoulder complaints in general practice, 24% of patients reported complete recovery after 3 months, increasing to only 32% after 12 months [24]. Similarly, in a recent study on non-traumatic arm, neck and shoulder complaints [17], 25% of participants reported complete recovery after 6 months. These studies demonstrate a poor outcome of neck and shoulder symptoms, but included very heterogeneous populations. In a previous analysis of our cohort [18], we developed a prediction rule for shoulder pain with perceived recovery as outcome measure, and used the total cohort that was heterogeneous with respect to baseline symptom duration. For the current analysis, we decided to study the influence of potential prognostic factors in more detail, by looking at their effect on absolute changes in shoulder pain intensity, and by investigating prognostic factors in more homogeneous subgroups of patients. Given the strong evidence for the prognostic value of symptom duration we decided to stratify our analyses for acute, subacute and chronic pain at presentation, creating more homogeneous subgroups with different characteristics, and demonstrating a different prognosis.

Prognostic factors
Previous prognostic cohort studies have showed that several disease characteristics (symptom duration, levels of disability and more intense pain) are indicators of a poor outcome of neck or shoulder complaints [9, 10, 12, 14–17]. Our analyses confirmed the association between baseline levels of pain and disability, and changes in symptoms during follow-up. In our study, higher pain intensity at baseline was associated with larger reductions of pain at follow-up in both patients with acute or chronic shoulder pain. This finding may be explained by the fact that more pain at baseline leaves more room for improvement during follow-up [12].

It has previously been suggested that psychosocial factors such as worrying [12], somatization [17, 28], catastrophizing [28], distress [28, 29] and fear-avoidance beliefs [28, 30, 31] are likely to predict a poor outcome of painful musculoskeletal conditions. The association between psychosocial factors and musculoskeletal pain has mainly been established in patients with chronic pain syndromes [31, 32]. In our population, somatization was associated with poorer outcome in the univariable analyses, but the association was no longer significant in the multivariable model. More catastrophizing, however, was significantly related to smaller reductions of pain at follow-up in patients with chronic shoulder pain. We previously reported an association between catastrophizing thoughts and perceived recovery of shoulder pain at 3 months follow-up [33], but our analyses now show that in patients with chronic shoulder pain, catastrophizing is the
strongest predictor of change in pain intensity over 6 months follow-up, next to baseline levels of pain.

Catastrophizing [34] is considered to be an ineffective coping strategy in which pain is perceived as overly destructive, and patients have a pessimistic view of their prognosis. The fact that catastrophizing was especially important in patients with chronic shoulder pain may indicate that catastrophizing is a consequence of pain, rather than a predictor of the development of chronic pain. Surprisingly, Table 3 also shows that in patients with acute pain, catastrophizing was associated with larger improvements of pain, even though the association was weak and not statistically significant in the multivariable model. Possibly, this is a chance finding. Alternatively, based on the assumption that the catastrophizing scale measures if patients are more strongly oriented towards pain stimuli, one may hypothesize that patients with high scores on catastrophizing avoid pain-provoking activities, which may actually be an effective strategy in the acute phase of a shoulder problem. Inadequate beliefs and attributions of pain, however, may become stronger when pain persists, or when recurrences of pain occur. If the negative influence of catastrophizing can be confirmed in other shoulder pain populations, future research might be aimed at the development and evaluation of interventions aimed at reducing such negative processes, from which patients with chronic shoulder pain in primary care may benefit.

Strengths and weaknesses

Our sample of shoulder pain patients is relatively large, allowing stratification of patients according to duration of their symptoms. Drop out among patients was low (8% at 6 months). Although drop-outs were younger, more often showed an acute onset and less repetitive movements in their work, the absolute differences in age, acute onset and repetitive movements were not large and it is unlikely that these differences have strongly influenced the reported associations between potential predictors and outcome.

The prognostic model for patients presenting with acute shoulder pain explained 46% of the variance in pain scores at follow-up, but for chronic pain patients this was only 21%. This means that much of the variance in this patient group remains unexplained. Even though we included a wide variety of potential predictors, we may have missed relevant predictors, such as social support or aspects of the psychosocial work environment [17, 35, 36]. We may also have been unable to measure important predictors with sufficient accuracy. Exposure to physical load, for example, was measured using a few simple questions, but has been shown to be associated with neck or shoulder pain in other cohorts [36, 37]. Further research is needed to identify relevant and preferably modifiable predictors of outcome, especially in patients with chronic shoulder symptoms. Studies carried out in occupational settings may be more suitable to address the importance of work-related factors in the prognosis of shoulder pain.

We decided not to include treatment in our models, as we assumed that confounding by indication could influence our findings. Patients with more severe symptoms and thus, probably a poorer outcome, are more likely to receive more extensive treatment. Our results seem to confirm this assumption; the proportion of patients receiving wait-and-see policy or pain medication was higher in patients with acute pain compared with chronic pain, while the proportion of physiotherapy referrals was higher among those with chronic shoulder pain. However, the large majority of patients in each subgroup was treated by wait-and-see or medication in the first month, indicating that our GPs largely adhered to the Dutch practice guidelines for shoulder complaints, which recommend such a policy during the first 2–4 weeks after presentation [19]. This means that our subgroups were relatively homogeneous regarding treatment at baseline. Treatment variables were, indeed, not strongly associated with outcome nor strongly influenced the association of other predictors (data not shown).

Clinical usefulness

In The Netherlands, nearly every Dutch resident is registered with a GP. Patients first visit their GP before visiting a specialist in rheumatology or orthopaedics. This is comparable with, for instance, the British healthcare system. The participating practices, being situated in both rural and urban areas in various provinces, form a representative sample of Dutch GPs. Although we encouraged GPs to select every eligible patient, we do not know what proportion of patients was invited or whether this was
a selective sample. When asking GPs about their success in recruiting patients, they indicated that common reasons for not including patients concerned the exclusion criteria and lack of time or motivation to ask all patients during consultation hours. Patient characteristics at baseline and overall recovery rates (30% after 6 weeks and 34% after 6 months) were similar to those found in other studies carried out in primary care populations [9–11], which may strengthen the generalizability of our findings to other primary care patients with shoulder problems.

The GPs in our study adhered to the stepwise approach recommended by the national guidelines, and offered injections or physiotherapy to only a few patients. Our findings indicate that GPs can take duration of symptoms at presentation into account, and do not necessarily have to apply the same stepwise approach to each patient with shoulder pain. A more targeted approach (with for example, advice regarding pain coping strategies, or more early referral for exercise) might lead to better patient outcomes in chronic shoulder pain patients, but this needs to be confirmed by randomized research. As yet, the results from our study may help GPs to provide patients with more accurate information on the expected course of their symptoms. By separately analysing acute, subacute and chronic shoulder pain, we were able to present prognostic information for more homogeneous subgroups of patients compared with previous cohorts.

Conclusion

The results of this study indicate that patients presenting with acute, subacute or chronic shoulder pain show different baseline characteristics, a different course of symptoms, and possibly, also different predictors of outcome after 6 months. Improvement of symptoms in patients presenting with acute shoulder pain was mainly predicted by the severity of pain and disability, whereas psychological factors may influence outcome in those with chronic shoulder pain. The importance of psychosocial factors in patients with chronic shoulder pain needs to be confirmed in further research, as this may provide input for the development of future interventions.

Rheumatology key messages

- Previous studies demonstrate poor outcome of shoulder symptoms, but have included heterogeneous populations.
- Our study shows that both course and prognosis differs between patients presenting with either acute or chronic shoulder pain.

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