

Physical Therapy for Patients with Back Pain

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Key Words

Back pain, physical therapy diagnosis, treatment, description.

Summary

The aim of this study was to describe the physical therapy diagnosis and treatment in patients with back pain. More specifically, the relationship between the duration of the complaint and the diagnosis and treatment was analysed. Data were used from a representative survey of physical therapeutic practice in the Netherlands. The patients were divided into three groups on the basis of duration of the complaint.

It was found that the physical therapy diagnosis and treatment vary with the duration of back pain. Patients with a relatively brief history of pain suffer more frequently from impairments in muscle tone, restriction in joint range of motion and sciatic pain; they also suffer more frequently from disabilities in their daily life. In the treatment of these patients, physical therapy modalities and manual therapy are more often used. Patients with a relatively long duration of back pain suffer more frequently from reduced muscle strength, and improvement of muscle strength is more frequently indicated as treatment goal. Exercise therapy and massage are more often used in the treatment of the patients.

The implications of these results with regard to the design and interpretation of future outcome studies are discussed.

Introduction

Physical therapy plays an important role in the treatment of patients with back pain. Between 10% and 50% of patients with back pain receive physical therapy (Biering-Sørensen, 1983; Deyo, 1987; Grundmeijer and Brouwer, 1989).

The effectiveness of physical therapy for patients suffering from back pain is however still unclear (Deyo, 1983; Koes *et al*, 1991b; Frank, 1993; Walker *et al*, 1993). In recent research, Koes *et al* (1992) found that both manual therapy and physical therapy had a positive effect on patients suffering from chronic back pain (lasting for longer than six weeks). Chavannes (1992) and Faas (1992) found that exercise therapy had no effect on patients with acute back pain.

A problem with the interpretation of the results of a great deal of outcome research is the general inadequacy of the methodology used (Deyo, 1983; Koes *et al*, 1992; Walker *et al*, 1993). Homogeneous groups are seldom used (Deyo, 1983; Koes *et al*, 1991a; Walker *et al*, 1993). Diagnosed back pain is generally employed as a selection criterion for patients. Patients suffering from back pain, however, are

a heterogeneous population (Koes *et al*, 1991a; Walker *et al*, 1993). A diagnosis of back pain is in general not informative enough for physical therapists, who make their own physiotherapeutic diagnosis on the basis of a targeted examination, on the basis of which they decide on treatment. A general description of physiotherapeutic diagnoses and interventions and the relations between them has been presented by Dekker *et al*, 1993). However, information is still incomplete.

Another methodological problem of the existing research on the treatment of back pain is the lack of knowledge about duration and frequency of treatment and the type of interventions used (Heijden *et al*, 1990; Koes *et al*, 1991a). The use of different modalities was described by Deyo and Tsui-Wu (1987). They found that the longer the pain had been present, the greater the use of heat, traction and exercises.

The goal of the present study is to describe physiotherapeutic diagnosis and treatment of patients with back pain. More specifically, it analyses whether diagnosis and treatment depend on the duration of the complaint. The results of this research could be used in the design and interpretation of future outcome studies; in this way the methodological problems mentioned above could be remedied, at least partially.

The treatment of patients with short-term back pain is expected to differ from the treatment of patients with long-term back pain (Deyo, 1983; Zarkowski and Philips, 1986; Knibbe, 1987; Waddel, 1987; Lee, 1988; Tollison *et al*, 1989; Frank, 1993). The treatment of short-term back pain should be targeted at the alleviation of pain and regulation of muscle tone (Lee, 1988). In physiotherapy practice, pain is treated largely by massage and physical therapy modalities (DeRosa and Porterfield, 1992). In patients with long-term back pain, the improvement of muscle strength with the help of exercise therapy should be central (Deyo, 1983; Knibbe, 1987; Tollison and Kriegel, 1988; Tollison *et al*, 1989; Twomey and Taylor, 1990). In addition to exercise therapy, patient education is also important with these patients (Walker *et al*, 1993).

In the present study, the following expectations of the physiotherapeutic diagnosis and treatment of patients with back pain were tested:

● The shorter the duration of back pain, the more attention will be paid to alleviation of pain and regulation of muscle tone.

● The shorter the duration of back pain, the more frequently physical therapy modalities will be used.

● The longer the duration of back pain, the more attention will be paid to the improvement of muscle strength.

● The longer the duration of back pain, the more frequently exercise therapy will be used.

Method

Registration

Data were used from a survey of physical therapy in Dutch primary health care. In this survey, which lasted from 1989 until 1992, data were collected by 83 physical therapists, working in 32 physical therapy practices in primary health care. In this period all newly referred patients were registered using a specially designed form. This registration form relates to three main categories of physical therapy care (Triet *et al.*, 1990):

1. General patient characteristics, complaints and the indication for referral established by the referring physician. The indication of referral is classified using the International Classification of Primary Care (ICPC, Lamberts and Wood, 1987).
2. Diagnosis (Dekker *et al.*, 1993) (see figure 1). The physical therapeutic diagnosis is made in terms of the International Classification of Impairments, Disabilities and Handicaps (WHO, 1980)*. The diagnosis comprises two parts: impairments and disabilities (see tables 2 and 3). (Triet *et al.*, 1990).
3. Treatment goals and the interventions used (see table 5). The treatment goals and application of interventions were registered in each session.

*Diagnosis in physical therapy seems to encompass more than a description of the patient's health status in terms of impairments and disabilities (Heerkens *et al.*, 1993). However, in this article diagnosis is restricted to impairments and disabilities, which are an important part of the diagnosis.

Research Population

This study has made use of the patient population from 1989 to May 1991. All patients with a medical diagnosis of back pain were selected. This relates to the ICPC codes: L02 back symptoms/complaints; L03 low back complaints without radiating pain; L86 lumbar disc lesion, back pain with radiating symptoms (Lamberts and Wood, 1987).

The patients were categorised into three groups:

- Patients with back pain present for less than one week at the start of physical therapeutic treatment (Frank, 1993).
- Patients with back pain which had been present for longer than three months (Sikorski, 1985; Tollison *et al.*, 1989; Mischner van Ravensburg *et al.*, 1992; Frank, 1993).
- An intermediate group, consisting of patients with back pain for more than one week but shorter than three months.

Analysis

The general characteristics of the patient, the complaint and the diagnosis by the physical therapist were established for each patient: these data were analysed at the level of patients.

In each session, the therapist indicated treatment goals and interventions. The data on treatment goals were analysed at the level of patients; the data which were gathered at the level of sessions were reduced to the level of patients: we calculated the frequency with which a treatment goal occurred at least once in the course of the patient's treatment. The data on interventions were analysed at the level of interventions: we calculated in which percentage of the total number of interventions, a certain intervention was used.

In testing the differences between groups, the chi-square test with a significance level of 0.05 was used. This test shows whether there is a significant difference between any of the three groups of patients. If a significant difference was observed, we then determined whether there was a linear association with the duration of the complaint. The Mantel-Haenszel test for linear association with a significance level of 0.05 was used for this purpose.

| Diagnosis | Treatment goals | Treatment |
|--|---|---|
| All impairments and disabilities which are observed in a patient | Subset of impairments and disabilities: Treatment is primarily aimed at improvement in these impairments and disabilities | Application of interventions aimed at improvement in impairments and disabilities chosen as treatment goals |

Figure 1: Relationship between diagnosis, treatment goals and treatment

Results

Patient Characteristics

In total, 3,587 patients with back pain were included in the study. The duration of the complaint was known in 3,507 patients. At the start of physical therapeutic treatment, 19.9% (N = 698) of the patients had their complaints for less than one week, 55.3% (N = 1,941) for more than one week but shorter than three months and 24.8% (N = 868) for longer than three months.

Age and sex are shown in table 1. Sex shows a linear relation with the duration of the complaint. The proportion of women grows with increasing duration of the complaints. No

Table 1: Sex and age of patients categorised according to duration of back complaint

| | Duration of complaint at start of physiotherapy | | | Chi-square P | Linear association P |
|--------------------|---|---------------------------|-----------------|-----------------|----------------------------|
| | < 1 week % | 1 week - 3 months % | > 3 months % | | |
| Sex | | | | 0.00 | 0.00 |
| Male | 58.6 | 52.9 | 41.7 | | |
| Female | 41.4 | 47.1 | 58.3 | | |
| Age (years) | | | | 0.14 | 0.91 |
| 0-14 | 0.6 | 0.4 | 0.7 | | |
| 15-24 | 8.3 | 11.0 | 12.1 | | |
| 25-34 | 21.5 | 21.8 | 21.7 | | |
| 35-44 | 25.4 | 23.8 | 20.4 | | |
| 45-54 | 20.8 | 18.5 | 18.9 | | |
| 55-64 | 13.9 | 12.0 | 13.2 | | |
| 65-74 | 6.3 | 8.6 | 8.2 | | |
| 75+ | 3.2 | 3.9 | 4.9 | | |
| N | 698 | 1,941 | 868 | | |

significant relationship between age and duration of complaint has been found.

Physiotherapeutic Diagnosis

The physiotherapeutic diagnosis comprises two parts: impairments and disabilities. It was possible for a patient to have more than one impairment or disability.

Impairments. In table 2 the occurrence of impairments is shown. The shorter the duration of back pain the more frequently impairments in respect of muscle tone and joint range of motion are diagnosed. Regarding sciatic pain, it has been found that the shorter the duration of the complaint, the more frequently this impairment is present. Reduced muscle strength arises more often with patients with a longer duration of back pain. Here too there is a linear relationship: the longer the complaint has been present, the more frequently muscle strength is reduced.

Disabilities. Table 3 shows the occurrence of disabilities. In general, patients with back complaints often have disabilities. They occur more frequently in patients with a shorter duration of back pain – especially disabilities in relation to self-care, physical control, mobility, household and professional activities and sport (with the exception of disabilities in respect of keeping balance, changing beds, doing housework and stress resistance) show this pattern.

Treatment Goals

Treatment goals concerning impairments. Table 4 shows how often the alleviation of or recovery from impairments has been the treatment goal on at least one occasion in the total treatment of a patient. The expectation that pain reduction and regulation of muscle tone will be chosen more often with a shorter duration of back pain appears to be incorrect. These two treatment goals are frequently chosen in all patients with back pain, there is no linear relation with the duration of the complaint.

The expectation that improvement of the muscle strength would more frequently be a treatment goal as the duration of complaints increases, appears to be correct. Furthermore it appears that the longer the duration of back pain, the more frequently improvement of posture is chosen as treatment goal. With a shorter

Table 2: Occurrence of impairment categorised into three groups according to duration of back complaint

| Impairment | Duration of complaint at start of physiotherapy | | | Chi-square P | Linear association P |
|---|---|---------------------------|-----------------|-----------------|----------------------------|
| | < 1 week % | 1 week - 3 months % | > 3 months % | | |
| Pain | 99.4 | 98.5 | 98.5 | 0.14 | 0.13 |
| Restriction in joint range of motion | 93.1 | 87.0 | 82.9 | 0.00 | 0.00 |
| Increased or decreased muscle tone | 86.8 | 82.1 | 82.7 | 0.02 | 0.05 |
| Diminished muscle strength | 18.1 | 29.5 | 36.5 | 0.00 | 0.00 |
| Posture (kyphosis, lordosis, scoliosis) | 61.9 | 62.0 | 61.8 | 0.99 | 0.95 |
| Swelling | 3.3 | 5.4 | 4.6 | 0.09 | 0.29 |
| Respiratory problems | 2.0 | 2.2 | 3.3 | 0.13 | 0.07 |
| Other impairments | | | | | |
| Nerve compression | 13.0 | 7.3 | 5.5 | 0.00 | 0.00 |
| Other | 27.1 | 34.4 | 38.1 | 0.00 | 0.00 |
| N | 698 | 1,941 | 868 | | |

Table 3: Occurrence of disabilities categorised into three groups according to duration of back complaint

| Disabilities | Duration of complaint at start of physiotherapy | | | Chi-square P | Linear association P |
|--|---|---------------------------|-----------------|-----------------|----------------------------|
| | < 1 week % | 1 week - 3 months % | > 3 months % | | |
| <i>Self care</i> | | | | | |
| Washing | 24.5 | 13.5 | 9.8 | 0.00 | 0.00 |
| Dressing | 34.0 | 18.4 | 15.1 | 0.00 | 0.00 |
| Using lavatory | 17.5 | 6.5 | 5.3 | 0.00 | 0.00 |
| Eating | 3.3 | 1.6 | 1.2 | 0.01 | 0.00 |
| <i>Physical control</i> | | | | | |
| Sitting | 57.6 | 41.6 | 38.7 | 0.00 | 0.00 |
| Standing | 46.6 | 35.2 | 38.2 | 0.00 | 0.00 |
| Kneeling | 34.5 | 26.5 | 29.8 | 0.00 | 0.08 |
| Bending | 76.8 | 65.3 | 63.7 | 0.00 | 0.00 |
| Keeping balance | 9.6 | 9.6 | 12.7 | 0.04 | 0.04 |
| <i>Mobility</i> | | | | | |
| Getting in and out of bed | 60.3 | 42.2 | 38.2 | 0.00 | 0.00 |
| Walking | 47.1 | 38.5 | 38.4 | 0.00 | 0.00 |
| Climbing stairs | 37.7 | 32.3 | 33.6 | 0.04 | 0.13 |
| Cycling | 27.1 | 19.7 | 20.3 | 0.00 | 0.00 |
| Driving a car | 34.1 | 23.7 | 20.2 | 0.00 | 0.00 |
| <i>Household and professional activities</i> | | | | | |
| Shopping | 25.2 | 26.4 | 29.1 | 0.19 | 0.07 |
| Preparing meals | 15.8 | 11.9 | 11.9 | 0.02 | 0.03 |
| Changing beds | 24.4 | 24.9 | 30.6 | 0.00 | 0.00 |
| Housework | 23.2 | 28.2 | 31.1 | 0.00 | 0.00 |
| Caring for other household members | 12.9 | 9.7 | 10.9 | 0.07 | 0.28 |
| Using telephone | 2.1 | 1.2 | 0.7 | 0.03 | 0.01 |
| Sitting for long periods | 72.8 | 65.5 | 61.1 | 0.00 | 0.00 |
| Standing for long periods | 68.2 | 62.0 | 61.3 | 0.01 | 0.01 |
| Lifting | 78.8 | 70.9 | 69.6 | 0.00 | 0.00 |
| Maintaining normal tempo during work | 62.5 | 59.1 | 58.3 | 0.20 | 0.11 |
| Stress resistance | 11.9 | 16.7 | 20.5 | 0.00 | 0.00 |
| <i>Sports/hobbies</i> | | | | | |
| Sport | 27.4 | 22.2 | 19.2 | 0.00 | 0.00 |
| Hobbies | 15.9 | 14.5 | 13.7 | 0.47 | 0.23 |
| Other activities | 9.6 | 11.6 | 11.2 | 0.34 | 0.37 |
| N | 698 | 1,941 | 868 | | |

Table 4: Treatment goals regarding impairments categorised into three groups according to duration of back complaint

| Treatment goal | Duration of complaint at start of physiotherapy | | | Chi-square P | Linear association P |
|--|---|---------------------------|-----------------|-----------------|----------------------------|
| | < 1 week % | 1 week - 3 months % | > 3 months % | | |
| Pain reduction | 65.4 | 65.8 | 62.8 | 0.14 | 0.12 |
| Reduction of swelling | 1.4 | 1.9 | 0.9 | 0.03 | 0.17 |
| Recovery of joint range of motion | 40.8 | 44.8 | 45.6 | 0.07 | 0.04 |
| Regulation of muscle tone | 47.3 | 50.5 | 46.1 | 0.02 | 0.28 |
| Improvement of muscle strength | 11.3 | 14.9 | 16.1 | 0.01 | 0.00 |
| Reduction of respiratory problems | 0.1 | 0.2 | 0.9 | 0.04 | 0.20 |
| Improvement of posture | 14.8 | 18.1 | 21.2 | 0.00 | 0.00 |
| Improvement in function spine and other joints | 37.5 | 23.6 | 17.7 | 0.00 | 0.00 |
| Improved stabilisation spine and other joints | 5.6 | 3.6 | 3.4 | 0.01 | 0.02 |
| Alleviation of other impairments | 5.9 | 7.9 | 9.3 | 0.02 | 0.00 |
| N | 698 | 1,941 | 868 | | |

duration of back pain, alleviation of impairments in the functioning of the spinal column and restoration of spinal column stability are more often chosen as treatment goals.

Treatment goals concerning disabilities. In general, reduction of disabilities is infrequently

chosen as a treatment goal. There are only two functions (sitting for long periods and maintaining normal tempo during work) which are chosen as treatment goals in more than 10% of the patients (not shown in a table). Furthermore only four disabilities show a linear association with the duration of complaints. Diminishing

Table 5: Application of interventions categorised into three groups according to duration of back complaint

| Intervention | Duration of complaint at start of physiotherapy | | | Chi-square P | Linear association P |
|-----------------------------------|---|---------------------------|-----------------|-----------------|----------------------------|
| | < 1 week % | 1 week - 3 months % | > 3 months % | | |
| Massage | 24.5 | 26.7 | 28.1 | 0.00 | 0.00 |
| Exercise | 16.5 | 19.1 | 19.6 | 0.00 | 0.00 |
| Manual therapy | 16.2 | 10.9 | 11.0 | 0.00 | 0.00 |
| Ultrasound | 3.6 | 3.6 | 2.4 | 0.00 | 0.00 |
| Interferential therapy | 10.7 | 10.1 | 9.8 | 0.02 | 0.01 |
| Shortwave | 2.5 | 2.7 | 3.0 | 0.03 | 0.01 |
| Heat and cryotherapy | 4.5 | 4.5 | 3.8 | 0.00 | 0.00 |
| Diadynamic currents | 1.3 | 1.0 | 1.0 | 0.00 | 0.01 |
| Physical therapy modalities total | 25.0 | 24.2 | 22.9 | 0.00 | 0.00 |
| Instruction and advice | 9.0 | 11.5 | 10.6 | 0.00 | 0.00 |
| Other | 8.8 | 7.5 | 7.7 | 0.00 | 0.00 |
| N | 14,297 | 47,681 | 21,822 | | |

disabilities in sitting, caring for other household members and getting in and out of bed occur more frequently with complaints of a shorter duration. Increased resistance to stress is more frequently chosen as a treatment goal with long-term pain.

Application of Interventions

Table 5 shows the relationship between the duration of the complaint and the application of interventions. The table shows that massage therapy and physical therapy modalities are the most used interventions with all three groups of patients. The expectation that the shorter the duration of complaints, the more frequently physical therapy modalities would be used, appears to be correct. This applies to interferential therapy, ultrasound, heat and diadynamic currents. The expectation that the longer the duration of back pain, the more frequently exercise therapy would be used, also appears to be correct. Furthermore, it appears that the longer a complaint has lasted, the more likely it is that massage therapy will be used. Manual therapy is less frequently used with long-term pain.

Duration of Treatment, Number of Sessions and Frequency of Sessions

Duration of the treatment. In figure 2, the relationship between the duration of the treatment and the duration of the complaints is shown. The figure shows that the shorter the duration of back pain, the shorter the duration of treatment ($P = 0.00$). More than half of the patients with back pain for less than one week (56%) had completed treatment after four weeks. Only a small proportion (3.7%) of the patients who came to physical therapists with back pain of less than one week duration were still having treatment after three months. Of patients with back pain of more than three

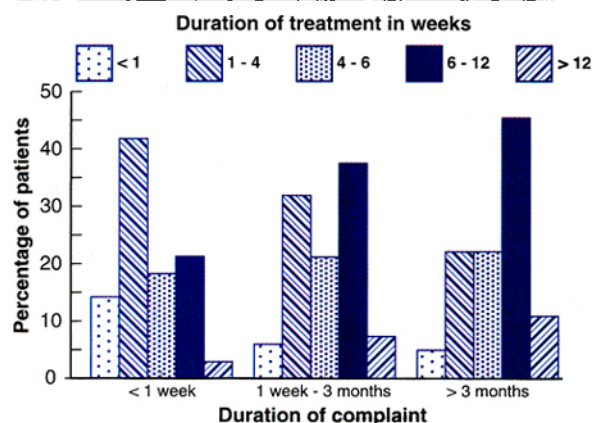


Figure 2: Relation between duration of complaint and duration of treatment

months' duration, approximately one quarter (24.8%) are treated for less than four weeks and 10% for longer than three months.

Number of sessions. In figure 3, the relation between the number of sessions and the duration of the complaint is given. There is a linear relationship between the duration of the complaint and the number of sessions: the shorter the duration of back pain, the fewer sessions are used ($P = 0.00$). It is striking that

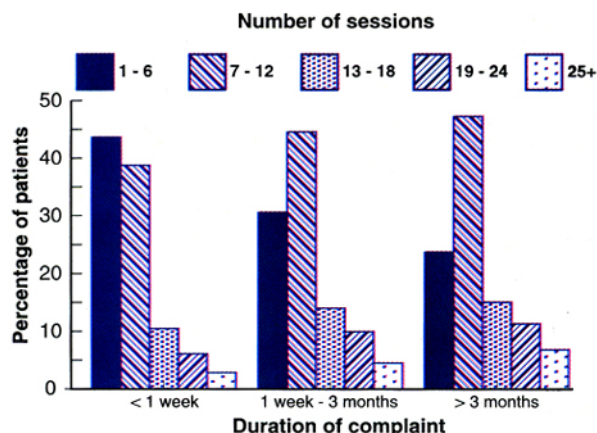


Figure 3: Relation between duration of the complaint and number of sessions

almost 44% of the patients with back pain of less than one week duration are treated with fewer than seven sessions. In the case of patients with back pain of more than three months' duration, this is only 24%.

Frequency of sessions. In figure 4, the relation between the duration of the complaint and the frequency of sessions is shown. A linear relationship is found between the duration of the complaint and the frequency of sessions: the shorter the duration of back pain, the higher the frequency of sessions ($P = 0.00$).

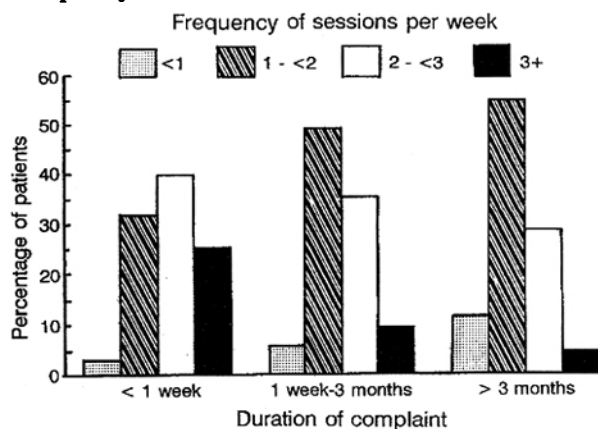


Figure 4: Relation between duration of complaint and frequency of sessions

Discussion

Four expectations on the physical therapeutic diagnosis and treatment of patients with back pain were tested, and three appeared to be correct. The longer the duration of back pain, the more attention is paid to muscle strengthening and the more frequently exercise therapy is applied. The shorter the duration of back pain, the more frequently physical modalities are applied. The expectation that the shorter the duration of back pain, the more attention will be paid to alleviation of pain and regulation of muscle tone, appeared to be incorrect. Alleviation of pain and regulation of muscle tone were frequently mentioned with all patients.

We cautiously conclude from these findings that physical therapeutic practice seems to correspond to guidelines in the literature on how to treat back pain. However, it should be noted that, although most of our expectations were confirmed, we only found rather small effects: the differences in diagnosis and treatment of patients with back pain of less than one week duration, from one week to three months' duration, and more than three months' duration generally were rather small. Although this is difficult to operationalise, one would expect somewhat larger differences. In other words, one

might question the clinical relevance of the differences between the three groups of patients, although the differences attained statistical significance. On the other hand, we really do not know how large the differences should be. There is a dearth of research on physical therapy, so there are no data which can be used to evaluate the size of the differences. Given the weakness of the body of knowledge in physical therapy, we regard the correspondence between guidelines in the literature and actual practice as quite encouraging.

Our study was prospective; in the first session, the physical therapists recorded the duration of back pain and their diagnostic findings – treatment goals, interventions and length of treatment were recorded subsequently. In addition, the therapists did not know that we would analyse the relationship between duration of back pain and the treatment; they collected similar data in all patients, without knowing our specific study goals. These circumstances help to give credibility to our results, which seem to be quite accurate.

In addition to a test of our expectations, this study yielded several other interesting findings. One finding concerns the duration of treatment: the shorter the duration of back pain, the shorter the duration of treatment (both in terms of weeks and number of sessions). This is in agreement with the literature, which shows that most back complaints (90%) are cured within a brief period (three to six weeks), with or without the help of rest, analgesics and/or exercise (Knibbe, 1987; Lankhorst, 1992; Nachemson, 1979). This does not necessarily mean that physical therapy is not useful in such cases. Its value could be the more rapid recovery of the patient, although the results of a recent study on exercise therapy in acute back pain do question this (Faas, 1992; Chavannes, 1992).

The findings with regard to the physical therapeutic diagnosis, treatment goals and the treatment can be summarised as follows.

- Patients with a relatively *short* duration of back pain suffer more frequently from impairments in muscle tone, restriction in joint range of motion and sciatic pain; they also suffer more frequently from disabilities in their daily life. Stabilisation and improvement of the functioning of the spine are more frequently indicated as treatment goal in these patients.
- Physical therapy modalities and manual therapy are more often used after brief periods of pain than for patients with a relatively *long* duration of back pain. These patients suffer

more frequently from reduced muscle strength. The strengthening of muscle and improvement in posture are frequently chosen as treatment goals and exercise therapy and massage therapy are frequently used for these patients.

Although the differences we found were small, it seems that the results should be taken into account in both the design and the interpretation of future outcome studies. Our study suggests the possibility that the effectiveness of interventions depends on the duration of the disorder. Based on the accumulated clinical experience, physical therapists choose the therapeutic strategy which is expected to yield the best outcome in a particular patient.

Although sound scientific evidence is lacking, clinical experience seems to have taught physical therapists that short-term complaints should be treated differently from long-term complaints. From this perspective, the observed differences between treatment goals and interventions in patients with short-term versus long-term complaints can be interpreted as differences with regard to the effectiveness of interventions in short-term versus long-term complaints. The possibility that the duration of complaints affects the therapeutic outcome seems worth exploration in future studies.

Finally, it should be noted again that our study is a description of practice in the Netherlands. Although we are inclined to believe that some principles of the treatment of back pain apply universally, practice elsewhere may vary considerably. Perhaps our study will stimulate others to do similar descriptive research on the treatment of back pain.

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