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Cognitive behavioural components in physiotherapy management of chronic Whiplash Associated Disorders (WAD) - A randomised group study*

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ABSTRACT. Different types of integrated management programmes have lately been introduced in the treatment of Whiplash Associated Disorders (WAD). In this study regular primary care physiotherapy and physiotherapy management with integrated components of cognitive-behavioural origin was compared in an experimental group study. The predictive value of self-efficacy was also addressed. In all thirty-three patients with chronic WAD were included in the trial.
Results revealed no significant differences between groups in self-ratings of disability or pain intensity. However, among the self-reported benefits of treatment, patients in the experimental group reported significantly less pain than did the comparison group. At three months follow-up the experimental group also reported better performance of daily activities.
Between group differences in the coping repertoire were found at pre-, post-and three-month follow-up. Generally, patients with high self-efficacy reported less use of 'maladaptive' and passive coping style than less self-efficient subjects at all times.
In conclusion cognitive behavioural components can be useful in physiotherapy treatment for patients with chronic WAD, but their contributions are not yet fully understood. Self-efficacy is related to patients' use of different coping styles. Positive long-term outcomes in WAD-patients could therefore be improved by boosting self-efficacy and by teaching patients to use active, adaptive coping strategies.

Key words: *Whiplash Associated Disorders, cognitive behavioural treatment, self-efficacy, coping, daily activity.*

RIASSUNTO. Componenti Cognitivo comportamentali nella gestione in terapia fisica dei disturbi cronici associati a "Colpo di frusta" - Studio su gruppo randomizzato. Recentemente sono state introdotte diverse tipologie di programmi di gestione integrata nel trattamento dei disturbi associati a "Colpo di frusta". In questo studio viene fatto un confronto, in un gruppo di studio sperimentale, tra una gestione regolare di cura primaria di tipo fisioterapico e una modalità di gestione fisioterapica integrata da componenti di origine cognitivo-comportamentale. É stato inoltre riportato il valore predittivo in termini di self-efficacy. Nello studio sperimentale sono stati inseriti in tutto 33 pazienti con disturbi cronici associati a "Colpo di frusta".
I risultati non rilevano differenze significative tra i gruppi nell'auto-valutazione del disturbo e dell'intensità del dolore. Tuttavia, relativamente ai benefici auto-riportati del trattamento, i pazienti del gruppo sperimentale hanno riferito un livello di dolore significativamente più basso rispetto ai pazienti del gruppo di controllo. Al follow-up dopo tre mesi, il gruppo sperimentale ha inoltre riferito migliori livelli di prestazione nelle attività quotidiane.
Sono state trovate differenze nelle capacità di coping, tra i soggetti dei due gruppi, al pre-test, al post-test e al follow-up dopo tre mesi. I generale, i pazienti con alti livelli di self-efficacy hanno riferito uno scarso utilizzo, in ogni momento, di modalità di coping di tipo passivo e maladdattivo, rispetto ai soggetti con livelli più bassi di self-efficacy.
In conclusione, le componenti cognitivo- comportamentali possono essere utilizzate con efficacia per il trattamento fisioterapico di pazienti con disturbi cronici associati a "Colpo di frusta", ma il loro contributo non è ancora stato compreso pienamente. La self-efficacy è associata ai differenti stili di coping utilizzati dai pazienti. Esiti positivi a lungo termine nei pazienti con disturbi associati a "Colpo di frusta" potrebbero quindi essere rinforzati intervenendo sulla self-efficacy e insegnando ai pazienti ad adottare strategie attive e adattive di coping.

Parole chiave: Colpo di frusta, trattamento cognitivo-comportamentale, self-efficacy, coping, attività quotidiana.

Introduction

A number of attempts have been made to evaluate different treatments of chronic Whiplash Associated Disorders (WAD) (1-7). Most interventions have dealt with less active and single component approaches attempting to decrease neck pain and/or increase neck mobility (1, 3, 4, 7). Only a few studies have included two or more different components in the treatment, that is, multimodal treatments (2, 5, 6). One type of multimodal treatment (i.e., relaxation, exercises, manual treatment and psychological support) was compared with a treatment based on the application of physical agents (i.e., electrical and sonic modalities) for WAD patients who had had neck pain less than two months after the injury (2). The authors concluded that patients with the multimodal treatment had a larger improvement in most outcomes. However, a learning theory framework was not applied in that study.

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Self-efficacy

A general principle in self-efficacy theory is that cognitive processes can mediate behavioural change and that cognitive events are induced and altered by an experience of mastery stemming from effective performance (8, 9). Self-efficacy has a strong relationship with proneness for behaviour change as well as maintenance of that change (10). Self-efficacy expectancy (9) is regarded as a personal belief of how successfully one can cope with difficult situations. This belief is also a major basis for action. In daily life, individuals analyse the situations that confront them, consider alternative courses of action, judge their abilities to carry them out successfully, and estimate the results the actions are likely to produce in advance (11). Thus, individuals with high self-efficacy expectancies should be more persistent in difficult situations than those with low expectances (8, 9). Self-efficacy expectancy is an important issue in pain management (11). In accordance with this standpoint, pain patients with high self-efficacy should show better compliance with treatment recommendations.

In an extensive review, Jensen and colleagues (12) found that chronic pain patients' disability levels were more strongly related to maladaptive cognitions, self-efficacy beliefs, coping style and perceived control, than to either pain intensity, chronicity or degree of pathology. Anderson and associates (13) concluded that chronic pain patients with higher levels of self-efficacy reported less intense pain, less daily interference due to pain, greater perceived life control, and higher activity levels. Further, several studies (14-16) emphasise the importance of self-efficacy in chronic as well as in acute pain patients. Altmaier and colleagues (17) found that after receiving counselling aimed to increase self-efficacy in coping skills, patients reported reduced back pain at a six-month follow-up. These authors also found that changes in self-efficacy during treatment predicted individual's level of functioning. Söderlund and associates (18) concluded that self-efficacy had a high predictive value for outcome in patients with whiplash associated disorders. Thus, it could be clinically and economically useful to boost patient's self-efficacy shortly after their injury.

Coping

Coping strategies have been classified according to whether they are attentional or avoidant. Attentional strategies focus directly on the source of pain attempting to manage it, while avoidant strategies includes denial of pain sensation, distraction and attention-diversion (19). The question as to whether a coping strategy is adaptive or maladaptive depends on the internal factors of an individual, the nature of the pain problem, and the specific situational factors. It must further be viewed in relation to interactions between the person and situation (20). Holmes and Stevenson (21) concluded that patients with recent-onset pain were adapted well as they employed avoidant coping, while in chronic pain patients the most adaptive style was attentional coping.

In a study (22) of patients with chronic WAD, strong associations between various coping strategies and outcomes were found. These results supported the idea of coping strategies as mediating factors between individual characteristics, like the initial grade of injury and self-efficacy, and physical as well as psychosocial wellbeing. Thus, it is important to study the factors that influence coping efforts.

Cognitive behavioural components in treatment

Recently Vendrig and associates (6), successfully used a cognitive behavioural approach for 26 patients with chronic neck pain after a whiplash injury. The researchers claimed that behavioural mechanisms were involved in symptom maintenance, and consequently, the symptoms should be reduced by using a treatment with a cognitive behavioural approach. In a meta-analysis of randomised controlled trials of cognitive behaviour therapy (CBT) for chronic pain in adults Morley and colleagues (23) concluded that CBT produced significant changes in most of the outcome measures, compared to untreated controls. In comparison to any other intervention where the patient had an active role, the differences were not that pronounced. Changes were further limited to the assessments of coping, social role functioning and pain experience.

In a controlled single-case study (5) physiotherapy management including cognitive-behavioural components for patients with chronic WAD was effective in decreasing pain related to the performance of daily activities.

The aim of the present work was to study the effects of a physiotherapy management complemented with cognitive-behavioural components in a group study. A further aim was to study if patients with high self-efficacy differed from those with low self-efficacy in reported use of coping strategies, disability, and pain intensity.

Method

Settings and subjects

The study was conducted in an orthopaedic clinic where patients who came to their three-month follow-up appointment after a whiplash injury and who still had significant symptoms like neck and shoulder pain (24, 25) were contacted. Inclusion criteria were continuous symptoms three months after a whiplash injury with reports of acceleration - decelaration movement of head (i.e., mechanism of injury), but without direct head trauma. Further inclusion criteria were age between 18 and 60 years and good ability to understand written Swedish. Patients reporting a history of neck injury before the actual whiplash injury were not excluded. Typically, patients had been involved in car-crashes (91%), mostly rear-end impacts (63%) and were rated as grade 1-3 according to The Quebec Task Force classification of WAD (25).

Ninety-one WAD-patients visited the orthopaedic clinic during the inclusion period. Three were pain free and 29 had already started other physiotherapy treatments. There were 59 patients who full-filled the inclusion criteria and among these, 26 declined participation. After informed consent 33 patients were assigned in two different intervention groups, that is, an experimental and a comparison group by a balanced randomised block procedure. One patient from the comparison group did not comply with the treatment and was therefore excluded in group comparisons. The characteristics of the sample are shown in table I.

Table I. ***The characteristics of the sample***

	Experimental group (n=16)	Comparison group (n=17)
Female	9	10
Male	7	7
Mean age (years)	37.7	43.5
Previous neck pain	4	5
Working at inclusion	9	14
Medication at inclusion	10	11

There were no differences between groups in the demographic data. To cover motivational aspects five questions were used in a self-report form. There were no differences in these treatment expectations. Among the 33 patients all but two expected to recover partly or totally. Thirty patients considered it to be very important or important to become pain free, while only two patients expected no change at all regarding ability to manage daily activities. All patients were prepared to engage in treatment, that is, to follow advice and change their habits. They were also prepared to conduct prescribed exercises on a regular basis.

Treatments

Before the start of the study, primary care physiotherapists in the area were contacted to explore what type of treatments they introduced to patients with WAD. A uniform approach of treatment for the comparison group was then decided upon together with these physiotherapists. It included exercises designed to enhance muscular stabilisation of neck, neck, and shoulder mobility with stretching and coordination of head movements, as well as exercises to maintain the body posture and arm muscle strength. Patients were given oral or written information (or both) and were expected to practice exercises at home or at the physiotherapy departments' gym (or at both places). The treatment could also include pain-relieving methods like relaxation, transcutaneous electric nerve stimulation (TENS), acupuncture and heath, which were given in the physiotherapy department.

The general treatment approach in the experimental group comprised four phases that included learning of basic physical and psychological skills, application and generalisation of these basic skills in everyday activities, and a phase for maintenance of these skills. A functional behaviour analysis approach was used to highlight the problem behaviours and to establish treatment goals, which also served as the basis for each treatment phase (5). The general treatment goals were to change the problem behaviours and recognise the factors that perpetuate muscular dysfunction. All skills training would be done at home. The treatment of the experimental group was completed by the experimenter.

During the basic skills phase the aims of the treatment, patient's ways of coping with increased pain and self-efficacy were discussed with the patients. The basic skills phase also included relaxation training and reeducation of a balanced cervicothoracic posture based on cervicothoracic muscular stabilisation techniques suggested by Sweeney (26). Further, exercises aimed to increase neck range of motion, co-ordination and endurance of neck muscles as well as re-education of normal humeroscapular rhythm was included.

The next two phases included application and generalisation of basic skills. During these phases, the basic skills were integrated with the everyday activities derived from the functional behavioural analysis (5).

The final part was directed at maintenance of skills trained earlier. Repetition of key components at the last session and a written summary of the program (27) were used to increase the probability that the gains from treatment would last.

Both comparison and experimental group treatments were individualised for each patient and maximised to 12 individual appointments with a physiotherapist. There was no significant difference in the number of treatment sessions between the groups, (Md (comparison group)= 6 and Md (experimental group)=11).

Measures and procedure

The self-report measures below were mailed to all subjects and collected by the experimenter. The physical measures were collected by an experienced physiotherapist who was blind to the group affiliation and who did not serve as a physiotherapist in any group. Physical measures, measures of disability, pain intensity, coping and individual characteristic (i.e. self-efficacy) were collected pre- and posttreatment, at three and six-month follow-up.

Measures used for comparing treatment groups

The Pain Disability Index (PDI) (28, 29) was used to describe interference due to pain in daily activities. The maximum score is 70 which corresponds to a high degree of disability. PDI is considered to be a reliable and valid measure of disability related to chronic pain.

A numerical rating scale (NRS) format (30) was used to measure pain intensity in a 7-day diary, completed four times a day before and after the treatment as well as during the follow-up period.

Patients' cervicothoracic posture was assessed with a universal goniometer (5, 31). The cervical rotation range of motion (ROM) was measured using a Lic Rehab Care Svetsary goniometer. Cervicocephalic kinaesthetic sensibility was measured with a method described by Revel (32). A more detailed description of these measures has been presented elsewhere (18).

Three different sources for measuring treatment integrity were used. An exercise diary was used to report all exercises the patients did at home. Each patient's treatment, duration, number of visits, and type of treatment were reported by the treating physiotherapists. Patients were also asked for what kind of treatment they had had and if they understood the purpose and principles of the treatment.

At post-treatment patients were asked four global questions regarding treatment results (33), if patients (1) perceived themselves recovered or had more pain; (2) had the ability to perform daily activities; (3) were satisfied with the overall treatment results; and (4) took any medication.

At the three and six months follow-up patients answered seven questions regarding treatment results (33), covering (1) ability to perform daily activities; (2) interference due to pain in daily life; (3) if and, (4) how learned skills were used; (5) supplementary treatment; and (6) medication, as well as (7) working status.

Measures used for comparing patients with high and low self-efficacy

The Self-Efficacy Scale (SES) (17) is a 20 item-scale that was originally designed to assess the confidence in performing daily activities among patients with chronic low back pain. It was recently even used in a study describing chronic WAD patients (22). The maximum score is 200. Higher scores reflect higher confidence.

The Coping Strategies Questionnaire (CSQ) (34-36) was used to analyse different strategies the patients used to influence pain. CSQ is a 48-item checklist in which subjects are asked to indicate the extent to which they use a given cognitive or behavioural coping strategy. The scores range from 0 - 6 for each item and the maximal score in each sub scale is 36. Higher scores indicate that a person uses the particular coping strategy more extensively.

The Pain Disability Index and Numerical Rating Scale also were used as outcome measures in this group comparison.

Data analyses

ANCOVA, with the measure for self-efficacy as covariate, was used to analyse between group (experimental and control) differences over time in disability and pain intensity based on theoretical considerations of its predictive value for disability and pain intensity (18, 37). ANOVA and MANOVA was used to analyse the interaction effects (treatment x time) in the physical measures, i.e. head posture, neck range of motion in flexion / extension, lateral left / right flexion, left / right rotation, and left / right cervicocephalic kinaesthetic sensibility. Six-month follow-up between group analyses for disability and pain intensity have been done with independent t-test, since they have been added later to the published paper. Chi-square statistics were used to analyse the data for self-experienced benefits of the treatment.

Based on our previous results (37) regarding the role of self-efficacy (as a predictor) and coping (as a mediating factor), we decided to assign a posteriori all patients into two different groups based on patients' initial self-efficacy scores from the SES (17)). Patients with high self-efficacy scored above the group SES mean (M=124.8) while those scoring below were assigned to the low self-efficacy group. The scores of the new groups were then analysed for differences at four points in time: pre- and posttreatment, at three- and six-month follow-up with student's t-test and repeated measures ANOVAs.

Results

Repeated measures ANCOVAs and MANOVAs showed no significant differences between experimental and comparison group over time in disability, pain intensity, or in any of the physical measures. Further, t-tests showed no significant differences in disability or pain intensity at six-month follow-up. Table II presents the pre- and posttreatment as well as three months follow-up means and standard deviations for these measures as well as for self-efficacy in both groups. Table II presents also six-month follow-up means and standard deviations for disability, pain intensity, and self-efficacy.

Self-experienced benefits of the treatment reported with global questions at posttreatment and follow-up were analysed. The results showed that the experimental group perceived themselves as having significantly (Chi-square= 6.5, df= 2, $p<0.05$) less pain than the comparison group at posttreatment. At three month follow-up patients' perceived ability to perform daily activities differed significantly between groups (Chi-square= 10.27, df= 3, $p<0.05$) in favour to the experimental group. Patients were asked if they applied what they had learned in order to manage or

Table II. ***The pre- and post-treatment, three and six months follow-up means and standard deviations for disability, pain intensity and self-efficacy as well as the pre- and post-treatment, and three months follow-up means and standard deviations for physical measures in experimental (n=16) and comparison (n=16) groups***

Variable	Pre- treatment mean (sd)		Post- treatment mean (sd)		Three months follow-up mean (sd)		Six months follow-up mean (sd)	
	Exp	Compar	Exp	Compar	Exp	Compar	Exp	Compar
Pain Disability Index	31.1 (13.5)	25.9 (11.9)	25.3 (18.6)	20.4 (16.7)	26.3 (17.5)	20.2 (15.7)	23.4 (17.2)	19.6 (16.0)
Pain intensity (NRS)	4.2 (1.8)	3.6 (2.0)	3.5 (1.8)	2.9 (1.8)	3.7 (2.3)	3.4 (2.4)	3.3 (1.8)	3.5 (2.3)
Head posture	39 (4.9)	38 (6.1)	36 (4.4)	36 (4.9)	37 (4.6)	37 (5.7)		
ROM flexion	44 (12.6)	47 (12.8)	48 (17.2)	55 (11.9)	51 (13.5)	56 (15.4)		
ROM extension	47 (15.7)	43 (7.7)	48 (16.2)	40 (8.1)	46 (13.3)	43 (15.1)		
ROM lat.flexion								
right	30 (7.7)	30 (9.4)	32 (9.6)	30 (9.6)	32 (8.0)	33 (8.0)		
left	31 (8.2)	31 (10.5)	31 (8.0)	31 (8.7)	31 (6.2)	29 (10.4)		
ROM rotation								
right	57 (10.4)	52 (15.5)	53 (10.6)	56 (11.6)	57 (10.6)	60 (15.8)		
left	59 (11.7)	58 (14.6)	54 (11.6)	64 (13.5)	60 (12.1)	60 (14.5)		
Co-ordination in rotation								
right	32.3 (16.6)	38.6 (19.3)	26.9 (15.3)	33.8 (18.5)	24.3 (9.5)	32.3 (16.8)		
left	31.0 (19.5)	29.8 (21.3)	23.2 (6.4)	23.5 (12.4)	23.6 (9.3)	28.4 (11.4)		
Self-efficacy	114.9 (43.9)	136.1 (34.2)	134.9 (40.3)	149.9 (35.6)	132.8 (43.3)	151.0 (37.3)	134.9 (46.9)	150.5 (32.8)

prevent neck pain; the results showed significantly better long-term compliance for the experimental group (Chi-square= 6.4, df= 2, p<0.05). At six-month follow-up there were no significant differences between the groups in these measures.

There were significant positive effects for the merged experimental and comparison group over time regarding disability (PDI) (F= 6.41, *df*= 2, 58, p<0.01), pain intensity (NRS) (F= 4.35, *df*= 2, 60, p<0.05), and two physical measures, that is, head posture (F= 7.77, *df*= 2, 60, p<0.001) and neck range of motion in flexion / extension (Wilk's Lambda= 0.61, *df*= 4, 26, p<0.01).

In order to study the associations and differences in coping process over time between patients with high and low self-efficacy, t-tests were performed at pre- and post-treatment and at follow-up. At pre-treatment patients with high self-efficacy scored significantly higher in Ignoring Pain Sensations (t = 2.26, df= 30, p<0.05). At post-treatment patients with high self-efficacy scored lower in four subscales: Reinterpreting Pain Sensations (t = 2.39, df= 30, p<0.05), Praying and Hoping (t = 2.46, df= 30, p<0.05), Catastrophizing (t = 3.39, df= 30, p<0.01), and Pain Behaviours (t = 2.09, df= 30, p<0.05). At three months follow-up the patients with high self-efficacy scored significantly lower in Diverting Attention (t = 2.49, df= 30, p<0.05), Reinterpreting Pain Sensations (t = 2.43, df= 30, p<0.05), Praying and Hoping (t = 3.12, df= 30, p<0.01), Catastrophizing (t = 3.26, df= 30, p<0.01), and Pain Behaviours (t = 2.32, df= 30, p<0.05). There were no group differences in reported use of coping strategies at six-month follow-up. Thus, patients who have high self-efficacy used less of those coping strategies that are characterised as more avoidant and passive (38).

Two-factor repeated measures ANOVAs were performed to study if there were any interaction effects between the groups including patients with high and low self-efficacy over time in disability or pain intensity. There was no such effect in disability (PDI) indicating a stable and parallel reduction for both low and high self-efficacy groups in disability. However, there was an interaction effect (high / low self-efficacy x time) (F= 3.84, df= 2, 60, p<0.05) in pain intensity (NRS). Post hocs (Tukey HSD) showed that low self-efficacy group reported significantly higher pain intensity at each point in time (p < 0.05) and that pain intensity decreased significantly (p< 0.05) in the low self-efficacy group at post-treatment. At follow-up this group had resumed their original pain intensity level. At six month follow-up the independent t-test showed a significant difference in PDI (t=2.32, df=29, p<0.05) in favour to the high self-efficacy group, but not in NRS. Thus, patients with low self-efficacy had a higher risk for relapse after this treatment. Table III presents the means and standard deviations for the low and high self-efficacy groups in disability and pain intensity.

Discussion

The results of this study showed that there were no significant differences between the two treatment groups over time in disability, pain intensity, or in any of the physical measures. However, the self-experienced benefits of the treatment differed significantly. The experimental group perceived lower pain intensity at post-treatment than did the comparison group. At three months follow-up the experimental group's perceived ability to perform daily activities was significantly better. This group also showed better long-term compliance, that is, they used the skills they had learned to manage or prevent neck pain in daily life significantly more often. However, these differences were not evident at six months follow-up. When patients themselves can choose daily activities as goals for treatment to be targeted, better long term results can be expected. In a study by Åsenlöf et al (39) of patients with musculoskeletal pain the experimental treatment was tailored according to each patient's individualized behavioural treatment goals. The results showed that the experimental group reported lower disability and pain intensity as well as higher pain control compared to comparison treatment group. The authors concluded that incorporation of biopsychosocial model of pain and tailoring the treatment according to patients' priorities of daily activities is highly beneficial in resuming activities and managing pain.

Cognitive behavioural components, that is, for example, learning to integrate basic physical and psychological skills in everyday activities, can be useful in the treatment of chronic WAD patients. Cognitive-behavioural approaches generally focus on coping deficits and maladaptive cognitive appraisals that cause difficulties in adapting to chronic conditions. In enhancing coping effectiveness, a number of cognitive-behavioural skills can be applied. These include for example stress-management skills, progressive relaxation, breathing control, challenging irrational beliefs, as well as teaching individuals to integrate these skills to every day life (40). In our study, a physiotherapist with no formal psychotherapeutic training conducted the experimental treatment. Treatment was directed towards changing behaviour in daily life as well as promoting specific coping strategies, and

Table III. ***Means and standard deviations for the low (SES mean=83.7) (n=13) and high (SES mean=154.2) (n=19) self-efficacy groups in disability and pain intensity***

Measure	Pre- treatment mean (sd)		Post- treatment mean (sd)		Three months follow-up, mean (sd)		Six months follow-up, mean (sd)	
	High	Low	High	Low	High	Low	High	Low
Disability (PDI)	21.3 (11.2)	37.5 (8.6)	14.7 (13.0)	33.8 (17.2)	15.6 (14.4)	32.9 (14.4)	16.4 (13.4)	29.5 (18.1)
Pain intensity (NRS)	3.0 (1.4)	5.3 (1.7)	2.7 (1.7)	3.9 (1.8)	2.6 (1.9)	5.0 (2.2)	2.9 (1.7)	4.2 (2.3)

problem solving skills but not towards negative cognitions (e.g. catastrophising thoughts). The lack of between group differences may therefore be explained by the fact that patients' thoughts were still dominated by maladaptive cognitions. This conclusion is supported by a study where patients' negative thoughts were targeted by the experimental treatment. The authors speculate that this might have been the reason why these patients reported decreased fear avoidance and increased pain control at posttreatment and follow-up (39).

There were several differences between the high and low self-efficacy groups in patients' coping repertoire during the course of the study. At pretreatment the group with high self-efficacy scored significantly higher in the coping subscale, Ignoring Pain Sensations. At posttreatment however, the same group scored lower in four coping subscales (Reinterpreting Pain Sensations, Praying and Hoping, Catastrophizing, and Pain Behaviours). Further, they scored lower in five subscales (Diverting Attention, Reinterpreting Pain Sensations, Praying and Hoping, Catastrophizing, and Pain Behaviours) at three-month follow-up. Our results also support the study of Jensen and colleagues (41) where a strong relationship between self-efficacy expectancies and different coping strategies in adjustment to chronic pain was found. Similary patients with knee osteoarthritis and high self-efficacy were more likely to cope with pain by ignoring pain sensations, using calming self-statements, and avoiding negative thinking (42). Increase in self-efficacy during the course of coping skills training is associated with both short-term and long-term improvements in pain and function (43, 44).

Maintenance of positive effects in pain control regimens is closely related to adherence and risk of relapse (45). Our results showed that patients with high pretreatment self-efficacy scored lower and had decreased pain intensity over time while patients with low self-efficacy scored higher in pain intensity pretreatment and had decreased pain at posttreatment but had increased pain at three and six-months follow-ups. Therefore it is suggested that treatment should aim to enhance self-efficacy in order to prolong improvements over time. Dolce (46) proposed that patients who do not strengthen their self-efficacy but do improve otherwise during the treatment may be more likely to relapse after completed treatment. It could be argued that patients with high self-efficacy actually did have less pain and were therefore scoring high in the self-efficacy scale. However, in a study of experimentally induced pain Keefe and colleagues (47) showed that osteoarthritis patients who scored high on self-efficacy had significantly higher pain thresholds and pain tolerance than patients scoring low on that measure.

Self-efficacy is important for the promotion of self-change. It accounts for latency and rate of change during treatment and for individual variations in behavioural change for subjects receiving the same treatment. It also is a predictor of whether specific coping tasks will be successful. In managing chronic diseases, self-efficacy theory provides a framework for structuring and implementation of treatment in the rehabilitation process (11). The first step would be an assessment of the client's background to identify domains and individual problems to be targeted for self-efficacy improvement (39). Consequently intervention strategies can be developed or improved (48).

A limitation in this study is the low number of study participants. This makes generalisations from these results preliminary. The lack of significant between group differences in the main measures might be due to that fact. However, the results in several clinically relevant measures were in favour of the experimental group. Another limitation is that the number of individual appointments varied in both groups, (12 as maximum). It would have been possible to incorporate number of appointments as a covariate in the statistical analysis. However, this was not done since the variation did not differ significantly between groups.

In conclusion, the results of this study indicate that physiotherapy with cognitive behavioural components can be useful in physiotherapy treatment for patients with chronic WAD, but its contribution is not yet fully understood. Further research with larger groups of participants is needed to investigate any effects of this approach. Self-efficacy is an important predictor of patients' use of different coping styles and positive long-term outcomes is likely to be improved by boosting self-efficacy and teaching WAD patients to use adaptive coping strategies.

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