



A blind, randomized, controlled trial of cognitive-behavioural intervention for patients with recent onset rheumatoid arthritis: preventing psychological and physical morbidity

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Abstract

This study examined the efficacy of a cognitive and behavioural intervention (CBT) for patients with recent onset, seropositive rheumatoid arthritis. Fifty-three participants with a diagnosis of classical or definite rheumatoid arthritis, who were seropositive and had less than 2 years of disease history were recruited into the trial. All participants received routine medical management during the study, although half were randomly allocated to receive an adjunctive psychological intervention. All pre- and post-treatment assessments were conducted blind to the allocation. Analyses were conducted of treatment completers and also by intention-to-treat. Significant differences were found between the groups at both post-treatment and 6-month follow-up in depressive symptoms. While the CBT group showed a reduction in depressive symptoms, the same symptoms increased in the Standard group. At outcome but not follow-up, the CBT group also showed reduction in C-reactive protein levels. However, the CBT group did show significant improvement in joint involvement at 6-month follow-up compared with the Standard group, indicating physical improvements above those achieved with standard care. These results indicate that cognitive-behavioural intervention offered as an adjunct to standard clinical management early in the course of RA is efficacious in producing reductions in both psychological and physical morbidity © 2001 International Association for the Study of Pain. Published by Elsevier Science B.V. All rights reserved.

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1. Introduction

There is a long history of research into the relationship between psychological factors and rheumatoid arthritis (RA) (Lerman, 1987). Research has consistently found that psychological factors, such as depression, affect pain and disability in chronic RA. Moreover, empirical evidence has demonstrated that psychological factors are more strongly associated with disability than disease parameters (McFarlane and Brooks, 1988). Research has highlighted the importance of factors such as coping strategies (Wright et al., 1996), self-efficacy (Buescher et al., 1991) and attitudes towards the illness (Weinman et al., 1996) in mediating the relationship between mood and disability in chronic RA. Research highlighting the importance of psychological

factors in outcome of patients with chronic RA led to the emergence of psychological interventions for this population. These have largely been based upon cognitive and behavioural principles which have aimed to help patients develop adaptive coping strategies, increased confidence in their ability to cope and helpful attitudes towards their illness.

There is now considerable evidence to suggest that cognitive-behavioural psychotherapy (CBT) is an effective, adjunctive treatment in chronic RA. Research has demonstrated that CBT is effective in reducing psychological disturbance, in addition to levels of pain, disability, joint function and even biological indicators of disease, such as erythrocyte sedimentation rate (ESR) (e.g. Bradley et al., 1985; Applebaum et al., 1988; O'Leary et al., 1988; Young, 1992). Conflicting results in the literature during the late 1980s led some authors to specify the conditions associated with positive outcome in CBT trials for chronic RA. Young (1992) suggested that those studies with positive

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outcome have all utilized broad based cognitive and behavioural interventions which are aimed at symptom management. Those studies which have used single mechanistic approaches or have relied less on self-management have generally shown poorer outcome (e.g. Mitchell, 1986). Some authors have also suggested that studies which have relied most heavily on people with severe, long-standing disease have found the least benefit from psychological interventions (Parker et al., 1988; Kraaimaat et al., 1995). Most studies have utilized heterogeneous groups of patients, with an emphasis on chronic RA (Young, 1992).

Over the past decade, there has been increasing emphasis on the importance of early medical intervention in RA (Emery, 1995), with numerous studies indicating the particular importance of disease course in the first 2 years to longer term outcome. For example, Fex et al. (1996) followed a cohort of 113 patients who had the disease for less than 12 months for 5 years after diagnosis. They found that radiological damage was at its most severe in the first 2 years of illness. Similarly, other authors have suggested that functional disability early in the disease can be predictive of longer term prognosis (Sherrer et al., 1986) and even mortality at 15 years of follow-up (Corbett et al., 1993). In a randomized controlled trial of patients with early seropositive RA treated with minocycline or placebo, O'Dell et al. (1998) were able to demonstrate highly significant differences in remission rates and in requirements for disease-modifying medication at four years' follow-up, despite the fact that the treatment itself lasted only a few months.

Such evidence suggests that the first 2 years of illness represents a particular window of opportunity in the physical treatment of RA. This, together with the observations noted above that people with chronic RA tend to respond less well to psychological interventions, raises the question whether like physical treatments, psychological interventions early in the course of RA may be particularly beneficial. Evers et al. (1998) found evidence to suggest that passive coping strategies in early RA were predictive of increased disability one year after diagnosis. They suggested that even within the first year of illness, patients are already developing unhelpful avoidance mechanisms which subsequently lead to increased levels of disability. In an open study of CBT for patients with RA within the first four years after diagnosis, Parker et al. (1995) reported extensive benefits for their programme, including improvements in helplessness, self-efficacy, coping, pain and health status. These results were in contrast to their earlier programme with more severely affected, chronic patients, where only improvements in coping were significant (Parker et al., 1988). Their study provides encouraging support for the application of CBT to RA early in the disease course.

These results taken together confirm that psychological factors are likely to influence disability from even early in the disease course. Interventions early in the disease course which aim to develop adaptive coping strategies and foster helpful attitudes towards the illness are likely to be of longer

term benefit. Any intervention which is able to limit the level of functional disability which develops early in the disease may well have longer term significance. Such a finding would be of particular interest if demonstrated within the crucial first 2 years of illness.

The present study was designed to investigate whether a cognitive-behavioural intervention applied within the first 2 years of illness could be an effective adjunct to medical management of RA. According to the results of Evers et al. (1998), it was hypothesized that CBT would be effective in reducing levels of disability and psychological distress, as measured by depression and anxiety. It was also hypothesized that improvements in medical indices, such as joint function, C-reactive protein and ESR would be associated with the psychological intervention.

2. Methods

2.1. Participants

The sample was drawn from rheumatology clinics at three hospitals in or near London. Participants were patients consecutively attending the clinics with disease duration of less than 2 years. Participants were aged between 18 and 75 years, diagnosed by a consultant rheumatologist as having definite or classic rheumatoid arthritis and seropositive for RA. Patients with a known history of mental illness or alcohol or drug abuse were excluded, as were those with insufficient command of English to complete the assessment and participate in the intervention.

Power calculations were all based on data from Bradley et al. (1985). Articular index assessing joint function, the main outcome measure, should with a combined sample of 38 show changes at 5% significance with a power of 95%. For depression, a sample size of 25 in each group is predicted to show changes at 5% significance with a power of 80%. With the sample size of 20 in each group, the following changes are also predicted to have at least 80% power at 5% significance level: subjective level of pain, erythrocyte sedimentation rate, anxiety level and disability.

Sixty-three patients were identified as meeting the criteria for entry into the study, of whom 56 (88.8%) agreed to take part. Of those 56, three were later excluded due to changes in their medical diagnoses. The remaining 53 participants entered the study. The average age of the participants was 55.06 (SD 14.07), with a mean duration of 12.63 months (SD 8.22). Seventy percent of the sample were women and 67% were married or cohabiting. Only 22% of the sample were currently working full-time, with 12% working part-time, 10% retired and the remainder not employed outside the home. Forty-seven percent of the sample had less than 12 years of schooling, with 24% reporting 12 years at school and 14% gaining a tertiary qualification. Sixty-seven percent of the sample were taking some combination of

disease modifying drugs, steroids and non-steroidal anti-inflammatories. Ten percent were taking disease modifying drugs only, 6% were taking non-steroidal anti-inflammatories and 13% taking steroids only. Only one participant was not taking medication at all. Medication usage was assessed for each group in terms of the frequency of prescription of difference classes of medication. No differences were evident between the groups at baseline.

2.2. Procedure

Suitable participants were identified and approached at rheumatology out-patient clinics and invited to take part in the study. Once participants had volunteered, all participants were assessed by a rheumatology research nurse (B.R.), on a set of standardized outcome measures, detailed below. Participants were randomly allocated by an independent researcher to either routine medical management ('Standard' group) or to routine medical management plus a cognitive behavioural intervention ('CBT' group). Order of randomization was determined according to a standard table of random numbers. All assessments were administered and scored by a research nurse (B.R.) blind to the condition to which each participant had been allocated. Participants and those administering the intervention were unable to be blind due to the nature of the intervention. The code has yet to be broken to the research nurse or those involved in data entry. To test for the blindness of the assessor, the research nurse was asked to guess to which group the participants belonged. Consistent with expectations, kappa correlations confirmed that there was not a reliable relationship between the guesses and the true allocation, suggesting that the research nurse was no more able than chance to guess the group to which participants had been

allocated ($\kappa = 0.022$, $P = 0.884$). Table 1 summarizes the demographic characteristics of the sample for each group.

Following intervention or a matched time interval, participants were reassessed by the rheumatology nurse, who remained blind to the allocation of participants to groups. There were four participants from each condition who dropped out prior to the post-treatment assessment, leaving 22 participants in the Standard group and 23 participants in the CBT group. Participants were again assessed after a 6-month period in order to assess maintenance of gains. There was no attrition from the trial between post-treatment and follow-up.

2.3. Measures

2.3.1. Hospital Anxiety and Depression Scales (HADS)

The HADS (Zigmond and Snaith, 1983) is a 14-item questionnaire specifically designed to assess anxiety and depression in a physically ill population. As such, the HADS avoids over-reliance on somatic symptoms of depression, which tend to be elevated in populations with general ill health. The HADS offers a separate score for both anxiety and depression and has been well validated for use with a variety of different illnesses.

2.3.2. Coping Strategy Questionnaire (CSQ)

The CSQ (Rosenstiel and Keefe, 1983) is a widely used and well-validated measure of coping strategies, which was originally developed for use with patients with chronic back pain, but has been well used in research on RA (e.g. Bradley et al., 1985). Rosenstiel and Keefe (1983) propose a scoring system which calculates the use of different categories of coping statements, providing seven subscales, of which two

Table 1
Means (standard deviations in parentheses) or proportions for CBT group and standard group at initial assessment

Measure ^a	CBT ($n = 23$)	Standard ($n = 22$)	Statistic	Significance ^b
Age	54.13 (14.29)	56.86 (12.75)	$t = 1.132$	$P = 0.293$
Time since diagnosis	13.39 (9.63)	11.16 (8.46)	$t = 0.190$	$P = 0.665$
Educational level	15 (65%) school only	13 (59%) school only	$Z = -0.971$	$P = 0.332$
Employment	26% FT, 22% PT, 52% NW	22% FT, 9% PT, 67% NW	$Z = -1.093$	$P = 0.274$
Marital status	74% married or cohabit	64% married or cohabit	$Z = -1.580$	$P = 0.114$
Ethnicity	91% Caucasian	95% Caucasian	$Z = -0.578$	$P = 0.563$
Medication	4.14 (1.58)	4.29 (2.05)	$Z = -0.839$	$P = 0.401$
Gender	16:7 F/M	16:6 F/M	$\chi^2 = 0.285$	$P = 0.593$
C-reactive protein	14.72 (11.9)	25.40 (38.8)	$t = 4.980$	$P = 0.031^*$
CSQ	54.35 (28.11)	45.23 (20.87)	$t = 1.225$	$P = 0.275$
ESR	23.61 (14.3)	29.55 (21.45)	$t = 2.043$	$P = 0.160$
HAD-A	8.65 (5.6)	6.36 (4.57)	$t = 0.869$	$P = 0.356$
HAD-D	4.87 (4.01)	4.68 (2.83)	$t = 0.687$	$P = 0.412$
RAI	14.09 (10.43)	12.24 (8.89)	$t = 1.002$	$P = 0.323$
HAQ	0.65 (0.63)	0.64 (0.52)	$t = 0.282$	$P = 0.598$
Pain index	37.10 (39.23)	42.81 (44.26)	$t = 1.868$	$P = 0.179$

^a CSQ, Coping Strategies Questionnaire; ESR, erythrocyte sedimentation rate; HAD-D and HAD-A, Hospital Anxiety and Depression Scale – Depression subscale and Anxiety subscale, respectively; RAI, Ritchie Articular Index; HAQ, Health Assessment Questionnaire. Employment: FT, full-time employment; PT, part-time employment; NW, not working.

^b * $P < 0.05$.

are categorized as maladaptive and the others as adaptive. Although various attempts at factor structure have been performed, these have not consistently produced replicable factors and hence the original scoring method will be reported.

2.3.3. Self-monitored level of subjective pain

Self-monitoring (Spence, 1991; Spence et al., 1995) was carried out three times per day for 7 days in a row at each assessment occasion. Each day was divided into three 8-h periods for which the patient recorded the number of hours and the severity of pain symptoms. Severity was recorded on a ten-point Likert-type scale. A pain index score was produced from Severity \times Duration (hours) of pain for each full day period.

2.3.4. Health Assessment Questionnaire (HAQ)

The HAQ (Fries et al., 1980) is a brief questionnaire which assesses the level of limitation and disability associated with illness. Van der Heide et al. (1995) have demonstrated that the HAQ is a good predictor of the short-term disease course in early RA. It has also been demonstrated to be sensitive to deterioration in early RA (Devlin et al., 1997).

2.3.5. Ritchie Articular Index (RAI)

The RAI (Ritchie et al., 1968) is a detailed, sensitive measure of the number of actively inflamed joints, which was administered by a trained rheumatology nurse. The assessment requires a nurse to put pressure on each joint and score the level of pain and inflammation providing a composite score. The RAI is widely used as a measure of joint function.

2.3.6. Disease measures

Erythrocyte sedimentation rate (ESR) and C-reactive protein were both measured through blood tests, taken by

the rheumatology nurse at each assessment period. ESR was measured in the present study using Westergren's method. Wolfe (1997) has recently argued that the combination of C-reactive protein and ESR provides the best indication of current disease activity for RA.

2.4. Psychological intervention

Treatments were conducted by two psychologists, according to a treatment manual developed specifically for the project. The programme involved eight individual therapist-client sessions, each lasting around one hour over an eight week period. The cognitive and behavioural intervention was developed from standard pain management approaches (e.g. Spence, 1991) and self-help educational material developed for patients with arthritis (e.g. Lorig and Fries, 1990). The programme included an educational component plus the following self-management skills: relaxation training, attention diversion, goal setting, pacing, problem-solving, cognitive restructuring, assertiveness and communication, and management of flare-ups or high-risk situations.

2.5. Analysis

Correlations between the measures at baseline were assessed to check for possible confounding. Cross-sectional comparisons of the two groups were made using *t*-tests or chi-square tests, as appropriate. Repeated measures 2×2 multivariate analysis of covariance were conducted to assess treatment effects from pre- to post-treatment. Longer-term changes were assessed by a 2×3 multivariate analysis of covariance. Two analyses were carried out. One was confined to treatment completers only, the other used intention-to-treat analysis, using the method of last-observation-carried-forward. Only the results of the first analysis will be presented, because the two methods yielded the same results overall.

Table 2
Means or proportions (standard deviations in parentheses) for completers and drop-outs at initial assessment

Measure	Completers	Drop-outs	Statistic	Significance
Age	56.02 (13.10)	49.75 (18.71)	$t = 2.835$	$P = 0.098$
Time since diagnosis	12.39 (8.46)	13.87 (7.18)	$t = 0.539$	$P = 0.467$
Educational Level	28 (62%) school only	3 (43%) school only	$\chi^2 = 1.580$	$P = 0.454$
Employment	24% FT, 16% PT, 60% NW	29% FT, 0% PT, 71% NW	$\chi^2 = 1.201$	$P = 0.549$
Marital status	69% married or cohabit	29% married or cohabit	$\chi^2 = 3.844$	$P = 0.146$
Ethnicity	93% caucasian	88% caucasian	$\chi^2 = 0.889$	$P = 0.641$
Medication	4.21 (1.81)	3.33 (2.58)	$\chi^2 = 1.005$	$P = 0.605$
Gender	32:13 F/M	5:3 F/M	$\chi^2 = 0.287$	$P = 0.866$
CRP	20.05 (28.95)	35.67 (25.16)	$t = -2.198$	$P = 0.033$
CSQ	50.52 (2.49)	39.00 (29.18)	$t = 1.169$	$P = 0.248$
ESR	26.61 (18.31)	29.50 (17.62)	$t = -0.362$	$P = 0.719$
HAD-A	7.64 (5.21)	9.38 (4.69)	$t = -0.880$	$P = 0.383$
HAD-D	4.86 (3.44)	7.37 (3.74)	$t = -1.758$	$P = 0.085$
RAI	13.37 (9.71)	21.29 (15.12)	$t = -1.842$	$P = 0.072$
HAQ	0.66 (0.57)	0.88 (0.67)	$t = -0.974$	$P = 0.335$
Pain index	40.72 (41.62)	53.10 (37.95)	$t = -0.633$	$P = 0.530$

3. Results

There were no significant differences between the two groups in age, gender, marital status, educational attainment, duration of illness, or medication usage. Also, the two groups were not significantly different prior to treatment on any of the assessment measures, except that the CBT group had a significantly lower mean C-reactive protein value than the Standard group ($t = 4.98$; $P = 0.03$). Baseline C-reactive protein levels correlated weakly with ESR but not with any of the other measures assessed, notably depression or RAI. Nevertheless, in view of the observed group differences, pre-treatment C-reactive protein values were used as a covariate in the subsequent analyses.

Eight patients (15% of the initial sample) failed to complete the post-treatment assessment. Drop-outs were equally distributed between the CBT and Standard groups. Drop-outs had higher levels of active disease, based on C-reactive protein levels. There was also a tendency for drop-outs to be younger, more depressed and have a higher level of joint dysfunction than those completing treatment (see Table 2).

3.1. Treatment changes

The two groups showed no significant differences in profiles of medications at outcome or follow-up. Repeated-measures analysis of covariance used initial C-reactive protein levels as a covariate. Between the initial and outcome assessments, the CBT group became less depressed, while the opposite was true of the Standard group (Group \times Time interaction: $F_{(1,41)} = 6.041$; $P = 0.018$) (Table 3). This difference between the groups was maintained at follow-up (Group \times Time interaction: $F_{(2,41)} = 3.915$; $P = 0.05$). A simple effects test confirmed that the scores at follow-up of the CBT group were significantly different from the standard group ($F_{(1,41)} = 18.44$; $P < 0.001$). There was a trend towards similar changes in anxiety, but these failed to reach significance at either post-treatment (Group \times Time interaction: $F_{(1,41)} = 3.2547$;

$P = 0.086$) or follow-up (Group \times Time interaction: $F_{(2,41)} = 2.522$; $P = 0.078$).

For coping strategies, outcome for each factor is reported in Table 4. Only one factor was significant at post-treatment comparing the two groups and that was reinterpreting the pain (Group \times Time interaction: $F_{(1,40)} = 5.842$; $P = 0.02$), although diverting attention approached significance (Group \times Time interaction: $F_{(1,40)} = 3.422$; $P = 0.07$). Both these factors demonstrated a significant interaction effect when follow-up data was included (Diverting attention: Group \times Time interaction: $F_{(2,39)} = 3.976$; $P = 0.05$; Reinterpreting pain: Group \times Time interaction: $F_{(2,39)} = 5.769$; $P = 0.02$). For both these subscales, the CBT group improved in comparison to the standard group over time. No other factor demonstrated interaction effects over the treatment or follow-up period, although increasing activity showed a main effect for time both at post-treatment ($F_{(1,40)} = 11.405$; $P = 0.002$) and follow-up ($F_{(2,39)} = 5.353$; $P = 0.027$), indicating an improvement in coping strategies for both groups, which was maintained. No other significant differences emerged between the groups.

The sample as a whole showed a significant reduction in pain ratings over the three assessments (Main effect of time: $F_{(2,39)} = 3.775$; $P = 0.028$). There were, however, no effects of Group or Group \times Time interactions for pain ratings.

Following the intervention, the CBT group showed a significant reduction in C-reactive protein levels compared with the Standard group (Group \times Time interaction: $F_{(1,38)} = 4.852$; $P = 0.033$), but this pattern of results was not maintained at follow-up (Group \times Time interaction: $F_{(2,38)} = 2.801$; $P = 0.067$). There were no significant differences either between groups or over time on the other biological indicator, ESR, or level of disability, measured by the HAQ. Over the three assessments, the CBT group showed significantly greater reductions in RAI ratings than the Standard group (Group \times Time interaction: $F_{(2,35)} = 3.138$; $P = 0.05$), although these differences were not significant immediately after the intervention (Group \times

Table 3

Means (standard deviations in parentheses) for treatment group by occasion for pre- to post-comparisons and over 6 months^a

Measure	CBT			RMM		
	Pre	Post	Follow-up	Pre	Post	Follow-up
HAD-D	4.87 (4.01)	3.83 (2.53)	4.09 (2.67)	4.68 (2.83)	5.9 (4.42)	6.09 (5.19)
HAD-A	8.65 (5.60)	7.13 (4.59)	7.18 (4.53)	6.36 (4.57)	6.82 (5.80)	6.77 (5.12)
CSQ	53.7 (26.65)	73.09 (26.08)	67.00 (28.2)	45.23 (20.87)	49.82 (29.78)	45.85 (24.88)
PAIN	36.03 (36.42)	24.08 (28.22)	24.23 (27.22)	42.81 (44.26)	36.19 (38.26)	25.02 (31.09)
HAQ	0.64 (0.60)	0.57 (0.52)	0.52 (0.45)	0.62 (0.44)	0.74 (0.61)	0.58 (0.63)
RAI	14.09 (10.43)	11.09 (8.54)	9.00 (7.46)	12.24 (8.89)	13.41 (10.43)	10.83 (7.69)
ESR	23.39 (13.67)	16.36 (9.94)	21.65 (19.23)	28.14 (18.76)	25.00 (16.42)	26.76 (18.46)
CRP	14.72 (11.90)	11.27 (8.75)	15.24 (14.44)	25.40 (38.83)	27.65 (37.14)	21.93 (32.34)

^a CBT, cognitive behavioural therapy plus standard care group; RMM, standard care; PAIN, daily monitored level of subjective pain; CRP, C-reactive protein.

Table 4
Means (standard deviations in parentheses) for the subscales of the Coping Strategies Questionnaire (CSQ)

Measure ^a	CBT			RMM		
	Pre	Post	Follow-up	Pre	Post	Follow-up
DA ^b	2.28 (1.61)	3.09 (1.86)	3.18 (1.70)	1.83 (1.70)	1.80 (1.70)	1.88 (1.33)
RP ^b	1.18 (1.01)	2.16 (1.54)	2.07 (1.43)	1.27 (0.71)	1.15 (1.56)	1.06 (1.07)
CAT	1.55 (1.43)	1.14 (1.26)	1.42 (1.36)	1.61 (1.09)	1.31 (1.14)	1.01 (1.05)
IP	2.51 (0.94)	3.13 (1.05)	2.97 (1.23)	2.13 (1.07)	2.96 (1.26)	2.91 (1.30)
P/H	2.48 (1.62)	2.25 (1.60)	2.52 (1.59)	2.05 (1.43)	2.16 (1.99)	2.26 (1.83)
CSS	3.05 (1.13)	3.48 (1.18)	3.55 (0.79)	3.09 (1.42)	3.24 (1.35)	2.88 (1.35)
IA	2.29 (1.36)	2.58 (1.04)	2.58 (1.21)	2.32 (1.12)	2.00 (1.34)	2.08 (1.15)

^a DA, diverting attention; RP, reinterpreting pain; CAT, catastrophizing; IP, ignoring the pain; P/H, praying and hoping; CSS, coping self-statements; IA, increasing activity.

^b Group \times interaction effect significant at $P < 0.05$.

Time interaction $F_{(1,35)} = 2.762$; $P = 0.10$). A simple effects test confirmed that the scores at 6-month follow-up were different between the two groups when means were adjusted for initial values, indicating that the CBT group had improved over and above the group receiving standard care ($F_{(1,35)} = 5.21$; $P < 0.05$).

3.2. Clinical significance

Changes may be statistically significant and yet too small to be clinically meaningful. For this reason, the HADS depression scores were re-analysed in terms of the percentages of patients meeting conventional criteria as 'possible' or 'probable' cases of depression (scores > 7 and > 10 , respectively) (Zigmond and Snaith, 1983). There was no difference prior to treatment in the proportion of patients presenting with clinical levels of depression, either in the 'possible' or 'probable' range (Fig. 1). The base rate of 'possible' depression (14%), according to the HADS, more than doubled for the standard care group over the treatment period (31%) and remained constant at follow-up (31%). The reverse was true for the CBT group. 17% initially met criteria for 'possible' depression, which reduced to 9% at post-treatment and further improved at follow-up (4%). The pattern was similar for 'probable' case-ness.

In addition, the RAI scores were re-analysed by coding participant's scores according to the degree of improvement which was displayed between pre- and post-treatment and pre-treatment and follow-up, as follows. WORSE = A deterioration in joint function as evidenced by a more than 25% increase in RAI score. NO CHANGE = A change of less than 25% in RAI score in either direction. SOMEWHAT IMPROVED = An improvement in RAI score of between 25% and 50%. MUCH IMPROVED = An improvement of over 50% in RAI scores. These ratings were then analysed using a Mann-Whitney U -test. Significant differences can be seen between the CBT and standard groups, both at post-treatment ($Z_{(1,35)} = -2.019$; $P = 0.04$) and at follow-up ($Z_{(1,35)} = -2.343$; $P = 0.019$). As can be seen in Table 5,

more participants in the CBT group were improved in comparison to those in the Standard group. At post-treatment, twice the number of participants were worse in the Standard group and four times as many were much improved in the CBT group. At follow-up, only one participant in the CBT group was worse in comparison to seven in the standard group and twice as many participants were much improved.

4. Discussion

This single-blind, randomized, controlled trial is the first such study published of a cognitive-behavioural intervention in the crucial first 2 years of rheumatoid arthritis. Patients who completed the intervention showed significant improvements over and above those attributable to routine outpatient management in the rheumatology clinic, notably in depressive symptomatology and in joint involvement, as measured by the RAI. This included a reduction in the number of new cases of possible and probable depression, according to the HADS. Clinically significant improvements were also observed in the CBT group relative to the Standard care group for joints, with only one patient in the psychological intervention group worse at 6-month follow-

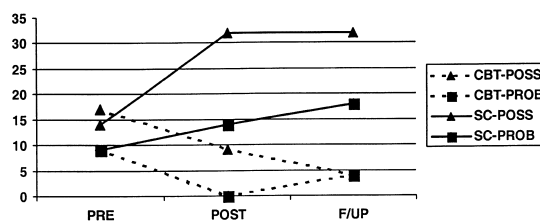


Fig. 1. Percentage of participants in each of the groups with 'possible' or 'probable' depression according to the HADS cut-off scores. CBT-POSS, percentage of participants in CBT group scoring > 7 on HADS depression scale; CBT-PROB, percentage of participants in CBT group scoring > 10 on HADS depression scale; SC-POSS, percentage of participants in standard care group scoring > 7 on HADS depression scale; SC-PROB, percentage of participants in standard care group scoring > 10 on HADS depression scale.

Table 5

Percentage of participants experiencing improvement in symptoms of swollen and painful joints, according to scores on Ritchie Articular Index^a

	CBT-POST (%)	SC-POST (%)	CBT-F/UP (%)	SC-F/UP (%)
Worse	17	36	4	27
No change	30	32	48	55
Improved	35	23	22	5
Much improved	17	5	26	14

^a Worse, more than 25% deterioration in symptoms; No change, no change >25% in symptoms in either direction; Improved, an improvement in symptoms between 25 and 50%; Much improved, an improvement greater than 50% in symptoms. CBT-POST and SC-POST, changes between pre- and post-treatment; CBT-F/UP and SC-F/UP, changes between pre-treatment and follow-up.

up. There was also a transient reduction in C-reactive protein, although the difference between patients who received CBT and the others was not maintained after 6 months' follow-up.

Participants were recruited from three different clinics, and are likely to be representative of patients attending rheumatology clinics with early RA. Changes over time in the whole sample are likely to reflect genuine changes in the disease course. The intervention itself was manual-based, and the results analysed by intention-to-treat as well as for completers alone. The results should therefore be generalizable and should reflect what would be expected in routine clinical practice.

Despite this careful attention to the study design and methodology, three limitations remain which must be considered when interpreting the results. First, although the sample size was average for CBT intervention studies and power calculations had shown this sample size capable of detecting group differences in various indices, a larger sample may have yielded more consistent results across variables. The current sample was investigated earlier in their illness and most variables improved with standard care (e.g. coping, pain levels, ESR). This is in contrast to the deterioration over time observed in other studies with more chronic samples (e.g. Parker et al., 1988; Kraaimaat et al., 1995). The resulting power may have been too small to detect differences in some of the other variables assessed. On the basis of the current results, power analyses indicate that a sample size of 42 in each group would have been sufficient to detect power at 0.80 at $P < 0.05$ for disability, a sample size of 60 for anxiety and a sample size of 84 for ESR. Future studies using an early intervention paradigm may need to bear in mind the smaller effect sizes found in this study for these variables. However, it could be argued that small or subtle changes which might have been detected in a larger sample are unlikely to be significant clinically as well as statistically.

The second problem is that the two groups were not ideally matched at baseline, as is more likely whenever modest samples are used. However, the only variable on which the groups differed substantially at baseline was the C-reactive protein level. This baseline difference between the groups was the reason for using initial C-reactive protein level as a covariate in the multivariate analysis of variance.

In any case, the lack of any significant correlations between C-reactive protein levels and other variables, notably RAI or depression, indicates that the observed between-group differences after the CBT intervention are unlikely to have been confounded by the differences in C-reactive protein levels at baseline.

Finally, the attrition rate from the study was modest and results remained significant using an intention to treat analysis. However, it must be noted that those who failed to complete the intervention were those with more active disease, who tended to be younger and more impaired and are arguably those most in need of psychological interventions. Although it is unclear whether this group would have benefited from the intervention, future research should investigate clinical strategies for reducing attrition in high risk groups, such as motivational interviewing (Miller, 1983).

Across the whole sample, improvements were observed over follow-up in disease indicators, joint function, pain, disability, anxiety, pain and coping strategies. Such improvements are to be expected, given that shortly after onset, the disease course is likely to be particularly aggressive (Emery 1995), and coping strategies (including those required to manage anxiety) take time to develop (Evers et al., 1998). The fact that a psychological intervention can produce additional physical benefits in a group likely to improve over time with standard medical care is very encouraging, because it provides a particularly stringent test of the intervention.

The only variable assessed in this study on which the standard group deteriorated over time was depression. While this may appear surprising given that these patients showed improvements in disease activity, the independence of depression from disease severity is consistent with previously published findings (McFarlane and Brooks, 1988; Büchi et al., 1998). The prevalence of depression at initial assessment was substantially lower than in previous studies relying on self-report measures. However, most previous studies have used samples with longer-standing disease. The rate of 'possible' depression measured by the HADS (31%) agrees exactly with the depression rate measured in the same way in a sample with more chronic disease from one of the clinics involved in the present study (Büchi et al., 1998). The only other study which has

assessed changes in psychological distress over time early in the disease, also failed to find evidence of improved adjustment over the first year of illness and found that nearly a quarter of their sample became more depressed (Evers et al., 1998). The present results suggest that early cognitive-behavioural intervention can reduce the substantial risk of patients developing depression later in the disease course and can also produce improvements in joint function. The study hypotheses were formulated on the basis of the demonstrated benefits of CBT. However, caution is required in attributing benefits to the specific effects of CBT rather than less specific factors. It is possible that the intervention worked mainly by increasing patients' adherence to their prescribed medications. However, this is implausible because a very high rate of non-adherence would be required initially to show a significant difference after the intervention, and much stronger associations would be expected among the disease activity variables at outcome and follow-up than were in fact found. Although we did not measure compliance, *per se*, the improvements were not observed in ESR or C-reactive protein and therefore, our data do not support this interpretation. Another possibility is that improvements were due to support or therapist attention, rather than the active treatment components. This could have been answered by including an attention placebo control group but given the available patient sample, this would have compounded the problems of power in the present study. However, therapist contact or attention alone has failed to yield significant improvements in previous studies (e.g. Bradley et al., 1985; Parker et al., 1988). Therefore, it seems unlikely that the clinically significant level of changes found in the present study could be attributed to support or attention alone.

Several factors may contribute to the significant improvement in the CBT group in joint symptoms, measured by RAI ratings. A key feature of CBT is to encourage patients to observe their own behaviour and attempt to quantify its effects, also setting up for themselves behavioural experiments and assessing whether they lead to improvement or the opposite. It is likely that CBT helps patients learn to balance rest and exercise and thus balance normal joint function with joint protection, resulting in improvements in overall joint function. Coping by avoiding situations which may lead to pain or distress may be associated over time with greater functional impairment. In the intervention, patients learn to recognize such fear-avoidant coping and are encouraged instead to approach activities in a gradual and sensible manner. In addition, despite the independence of depression and disease severity, the presence of depressive symptoms may influence individuals against continuing with or resuming an appropriate level of daily physical activity. Further research is warranted to elucidate the most likely mechanisms of change.

Changes in immune function in RA following psychological intervention have been reported previously, but not in C-reactive protein, which is considered the most sensitive

measure of disease activity in RA (Wolfe, 1997). While this result is encouraging and may reflect a genuine biological change, the two groups differed initially in mean C-reactive protein values. Even allowing for this by incorporating initial C-reactive protein value into the analyses as a covariate, this finding may be artefactual, and awaits replication. There can be no such doubt, however, regarding the statistically and clinically significant changes demonstrated over time for both depression and joint function. These results strongly suggest that CBT can be an effective adjunctive treatment for patients with rheumatoid arthritis and can help to prevent psychological and physical morbidity.

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