Original Article

Efficacy of Cognitive Behavioural Therapy for Patients with Chronic Pain in Singapore

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Abstract

Background: The use of Cognitive Behavioural Therapy (CBT) techniques to manage chronic pain is relatively new and understudied in Singapore. Using data collected from group CBT programmes carried out at the Singapore General Hospital (SGH), we seek to explore the efficacy of the programme on pain intensity, self-efficacy, attitudes towards pain, and emotional factors. We also examined the efficacy of the longer 6- to 9-day group programme versus an abridged 2-day version called the Pacing Programme covering only some aspects of the full group programme. Materials and Methods: Twenty-nine adult patients underwent the intensive 6- to 9-day group programme while another 10 patients underwent the abridged 2-day group programme. The more extensive group programme encompassed teaching patients cognitive-behavioural methods of coping with pain, such as setting goals, pacing, cognitive restructuring by thinking in more positively, distraction, problem solving, sleep hygiene, communication skills, ability to cope with changes, and relaxation techniques. The abridged programme focused mainly on developing pacing skills. Patients were required to fill out questionnaires at the beginning of the programme, end of the programme, and at the 1-month and 6-month follow-ups to monitor progress. Results: Preliminary results for the intensive 6- to 9-day group programme indicate decrease in pain and pain distress levels, improvements in management of pain, increased confidence to carry out activities despite pain, increased positive self-statements and decreased negative self-statements, decrease in fear of harm and pathophysiological beliefs, as well as decreases in the levels of depression, anxiety, and stress. The abridged 2-day programme yielded little change in pain and pain distress levels, but a slight increase in confidence to carry out activities despite pain. Conclusion: These preliminary results provide some evidence supporting the efficacy of CBT techniques in chronic pain management and contribute to the growing body of evidence for the effectiveness of psychological and behavioural techniques in the management of chronic pain.

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Key words: Group, Multi-disciplinary treatment, Psychological intervention, Psychotherapy

Introduction

Research from the last almost 4 decades suggests that multi-modal interventions, usually including Cognitive Behavioural Therapy (CBT), are not only efficacious but also cost-effective.[1-6]

The CBT model for chronic pain functions on the basis that factors like our cognitions, behaviours, affect, psychosocial situations and our physical conditions interact to interfere with or enhance effective coping.[7] Numerous studies indicate that beliefs about pain are associated with levels of functioning.[8] Changes in patients' beliefs about their pain tend to be associated with changes in their levels of functioning as well.[9,10]

The fundamental goal of CBT is not so much to reduce pain intensity but to improve patients' functioning and well-being, although pain reduction can often occur as a result of active coping. The cognitive aspect which usually involves cognitive restructuring teaches patients to identify, evaluate and change any unhelpful or inaccurate thoughts and beliefs about their pain experience. The behavioural

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aspect focuses on teaching patients adaptive coping skills.

The use of CBT as a form of treatment for chronic pain remains relatively uncommon in Singapore. Only in recent years has there been programmes established in selected hospitals providing such interventions. The current existing group programme in the Singapore General Hospital (SGH) is adapted from the pain management programme from the Royal North Shore Hospital in Australia aptly named ADAPT.[11]

There is virtually no research or data available for its efficacy in the local Singapore population. We seek to explore the efficacy of these group programmes on the management of chronic pain in our local population as well as to examine the efficacy of our longer 6- to 9-day group CBT programme versus an abridged 2-day Pacing Programme. It is also our hope that this study brings about greater awareness of the uses of CBT as a form of management for chronic pain.

Materials and Methods

Participants

The present study was conducted using data collected from a total of 39 patients who underwent our group CBT programme or an abridged group pacing programme. All the patients suffered from chronic pain and were referred for the programmes by their Anaesthesiologists. They were further screened by a team of psychologists and physiotherapists. Patients were excluded if they had low motivation for change, were still seeking 'cures' for their pain and if they were unable to fulfil the physical requirements of the programme. Twenty-nine adult patients underwent the group CBT programmes over 5 separate periods of time while another 10 patients underwent the group pacing programme.

For cost recovery purposes as well as ease of managing the groups, it was decided that the groups would run with a minimum of 6 patients and a maximum of 10 patients. The number of patients attending each group CBT programme was relatively consistent at 6 each with the exception of the fifth programme which had only 5 patients due to a last minute dropout. We were able to fill the pacing programme to its maximum capacity due to the shorter time commitment and the lower cost of the programme. As we have only had one run of the group pacing programme, the total number of patients remained at 10. Table 1 shows the breakdown in patient attendance, timeframe and length of the group programmes.

The most common pain condition for patients was lower back pain. Fourteen out of the 39 patients suffered from it. Other common conditions were neck pains (7), spondylosis (5) and fibromyalgia, failed back surgery syndrome and myofacial pains (4 each). Several of the patients had more than one diagnosed pain condition. Most of the patients were on pain medication during the programmes, mostly analgesics, medications for neuropathic pain and anti-inflammatory drugs. Several of the patients who attended the programmes were also on anti-depressants (Table 2).

Table 1. Breakdown in Patient Attendance of the Programmes Run

Programme run	No. of participants	Duration (days)	Date of programme (over 2 weeks)
CBT 1	6	6	Oct-Nov 2004
CBT 2	6	8	May 2005
CBT 3	6	8	Sept 2005
CBT 4	6	8	May-Jun 2006
CBT 5	5	9	Jan 2007
Pacing Programme	10	2 days, biweekly	Nov 2008 (over 1 month)

The study was approved by the Institutional Review Board (IRB) by the Ministry of Health and all patients were exempted by a waiver obtained from the IRB.

Treatment

Both programmes are outpatient services offered at SGH. The programmes were shortened and consolidated to suit the local population many of whom report difficulty committing to a 3-week long programme like ADAPT. The programmes consist of multi-disciplinary treatments delivered by Anaesthesiologists, Psychologists, Physiotherapists and Nurse Clinicians

The cognitive-behavioural aspects of the group CBT programme encompassed teaching patients cognitive-behavioural methods of coping with pain, such as setting goals, pacing, cognitive restructuring, distraction, problem solving, sleep hygiene, communication skills, maintaining changes, and relaxation techniques amongst others. The abridged group pacing programme focused mainly on developing goal setting and pacing skills but patients were also taught relaxation techniques and maintenance skills. All patients who partook in the group CBT programme were required to fill out questionnaires pre- and post-programme, at the 1-month and 6-months follow-ups to monitor progress. Patients who underwent the group pacing programme only filled out questionnaires pre- and post-programme.

Measures

Table 3 shows the scales and measures used in our questionnaires.

Data Analysis

Analyses were carried out using the Statistical Package for the Social Sciences (SPSS) Version 17.0. One-way repeated measures Analysis of Variance (ANOVA) was

Table 2. Demographic Information

	No. of patients (n)	Age (y)	Sex	Education level/language	Pre- and post-programme data returned	Full set of data returned
All patients	39	Average age: 47.15 Range: 25-78	82% female	All patients could speak and write in English except 3 patients from the pacing programme whom required translations into Mandarin during the programme and while filling out the questionnaires.	38	20
Patients in Group CBT Programme	29	Average age: 45.69 Range: 25-66	66% female	All patients had at least primary 6 education and could speak and write in English.	29	11
Patients in group pacing Programme	10	Average age: 51.40 Range: 40-78	100% female	Seven patients could speak and write in English and 3 patients required translations into Mandarin during the programme and while filling out the questionnaires.	9	9

Table 3. Scales and Measures used in Questionnaire

Scales	Measure	Scoring	Baseline
Pain Self-Management Checklist (PSMC)[11]	Frequency of use of a number of self-management strategies.	0-4 Higher scores = more frequent use of unhelpful strategies	Lowered scores can be taken to reflect the extent of learning and application of strategies taught in the programme.
Pain Self-Efficacy Questionnaire (PSEQ)[12,13]	Patient's beliefs about his/her ability to perform and enjoy activities despite his/her pain.[14]	0-60 Higher scores = stronger self-efficacy beliefs.[15]	Patient scores prior to commencing the programme were used as baseline scores for self-efficacy.
Pain Response Self-Statements Scale (PRSS)[16](not used in group Pacing Programme)	Assesses cognitions that are either positive (promoting coping) or negative (hindering coping) while patients are experiencing pain.	0 (almost never) – 5 (almost always)	Scores for positive and negative statements were taken prior to commence the group programmes and used as the baseline for assessing patients' attitudes about coping.
The Tampa Scale for Kinesiophobia (TSK)[17,18] (not used in group Pacing Programme)	Fear and Avoidance Beliefs patients may have had about their pain. In our group programmes, the subscales that measure Fear of Harm and Pathophysiological beliefs were also used.	1 (strongly disagree) – 4 (strongly agree)	Scores taken prior to starting the programmes were used as the baseline measure for patients' beliefs and attitudes about their pain condition.
Pain Intensity Scale	Highest, lowest and usual pain intensity over the last week and distress levels.	0-10 Higher scores = more pain 0-10 Higher scores = more distress	Patient scores prior to commencing the programme were used as baseline.
Depression, Anxiety & Stress Scale (DASS)[19,20] (not used in group pacing programme)	Depression, Anxiety & Stress	0-3 Higher scores = more depression, anxiety or stress	Baselines scores for all 3 scales are taken prior to commencing the group programmes and were used to monitor changes in depression, anxiety and stress levels.

In addition to the measures stated above, the RMDQ - Roland & Morris Disability Questionnaire.[21] The SF-36 Health Survey Questionnaire[22] and the Oswestry Questionnaire were also used. Most of which measure disability due to pain as well as general health related quality of life. The results of these measures are excluded from this present report as they are considered more as functional measures than psychological measures.

Table 4. Results of the CBT Programme over Time

		Pre-programme		Post-programme		1-month Follow-up		6-month Follow-up	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Pain Self-Management Checklist									
Use of Unhelpful Strategies***	11	27.00	12.78	16.91^^	9.40	13.64^^	9.59	13.73^^	10.03
Problem-Solving Ability	11	5.00	1.73	5.09	1.92	5.18	2.14	5.09	1.64
Pain Self-Efficacy Questionnaire									
Self-Efficacy***	11	37.46	10.71	47.32^^	10.12	45.36^	9.04	48.64^^	6.52
Pain Response Self-Statement Scale									
Positive Statements*	11	30.91	4.99	34.50	6.37	34.64	4.30	31.46	5.30
Negative Statements***	11	25.55	8.36	16.50^^	9.11	15.91^^	9.86	13.73^^	11.19
The Tampa Scale for Kinesiophobia									
Fear of Harm***	11	20.64	4.70	17.46	5.87	16.18^^	5.38	14.73^^	5.04
Pathophysiological Beliefs***	12	10.17	2.08	7.67^^^	3.45	7.38^^	3.39	6.58^^	2.71
Pain Intensity Scale									
Present Pain Level*	12	5.21	2.13	4.38	2.50	4.08^	2.11	3.33^	2.39
Lowest Pain Level in Past Week**	12	4.50	2.35	2.92^	1.83	3.50^	2.47	2.83^^	1.99
Highest Pain Level in Past Week	12	7.00	2.00	6.25^	2.42	5.83^	2.69	5.58^	2.87
Usual Pain Level in Past Week**	12	5.08	1.98	4.58	2.01	4.08^	1.93	3.33^	2.27
Pain Distress Level in Past Week*	12	5.29	2.03	4.54	2.33	3.92^^	2.11	3.42^	2.27
Depression, Anxiety & Stress Scale									
Depression**	12	10.92	8.93	5.83^	6.62	4.00^	5.54	3.83^^	7.40
Anxiety**	12	11.17	8.93	6.25^^	5.24	5.25^	5.83	4.42^^	6.78
Stress***	12	14.08	8.46	9.63^	7.12	6.08^^	5.85	5.83^^	6.83

* Significant main effect of time at $P < 0.05$
** Significant main effect of time at $P < 0.01$
*** Significant main effect of time at $P < 0.001$
^ Significant difference from pre-programme at $P < 0.05$
^^ Significant difference from pre-programme at $P < 0.01$
^^^ Significant difference from pre-programme at $P < 0.001$

used to examine change in measures over time (4 time points) for the CBT programme. In addition, Split-plot Analysis of Variance (SPANOVA) was used to determine if there was an effect of completeness of data (patients who returned questionnaires for all 4 time points vs patients who did not return questionnaires for 1-month and/or 6-month follow-up) on measures over time (pre-programme vs post-programme) for the CBT programme. SPANOVA was also used to examine the effect of programme type (CBT programme vs pacing programme) on measures over time (pre-programme vs post-programme).

Results

CBT Programme

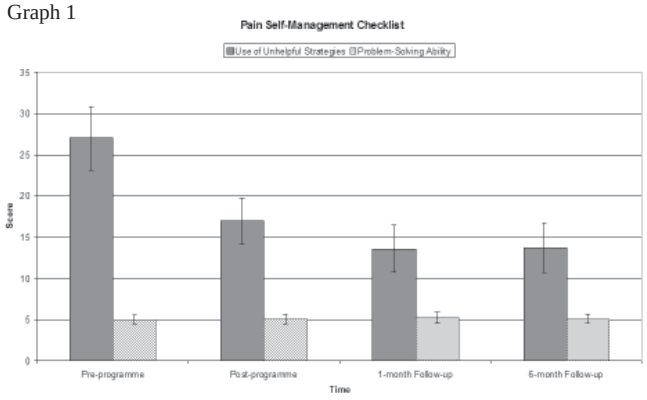
Table 4 and Figure 1 show a summary of the results from full group CBT programme.

Participants' ratings on the Pain Self-Management Checklist (PSMC) revealed a main effect of time on use of unhelpful strategies, $F(1.88, 18.80) = 20.17$, $P < 0.001$, while on the Pain Self-Efficacy Questionnaire (PSEQ), a main effect of time on self-efficacy was observed, $F(3, 30) = 9.41$, $P < 0.001$. In addition, there were main effects of time on positive self-statements and negative self-statements as documented on the Pain Response Self-Statement Scale (PRSS), $F(3, 30) = 3.25$, $P = 0.035$ and $F(3, 30) = 9.47$, $P < 0.001$, respectively. On The Tampa Scale for Kinesiophobia (TSK), main effects of time on fear of harm and strength of pathophysiological beliefs were independently significant, $F(3, 30) = 9.87$, $P < 0.001$ and $F(3, 33) = 8.56$, $P < 0.001$, respectively.

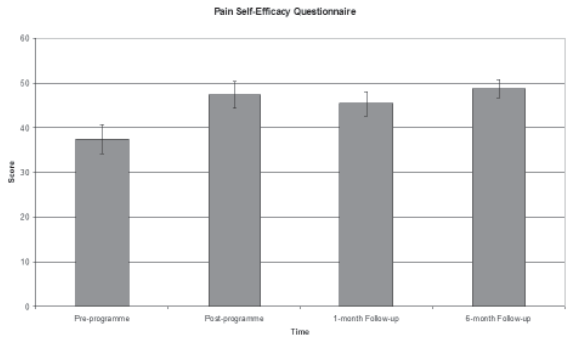
There were significant main effects of time on present pain level, lowest pain level in the past week, usual pain level in the past week, and pain distress level in the past week, $F(3, 33) = 3.04$, $P = 0.043$, $F(3, 33) = 5.07$, $P = 0.005$, $F(3, 33) = 5.28$, $P = 0.004$, and $F(3, 33) = 4.01$, $P = 0.015$, accordingly. Main effects of time on levels of depression, anxiety, and stress were also significant, $F(2.60, 28.65) = 5.49$, $P = 0.006$, $F(2.69, 29.62) = 5.23$, $P = 0.006$, and $F(3, 33) = 8.98$, $P < 0.001$, respectively.

Fig. 1. CBT programme over 4 time points (data from Table 2).

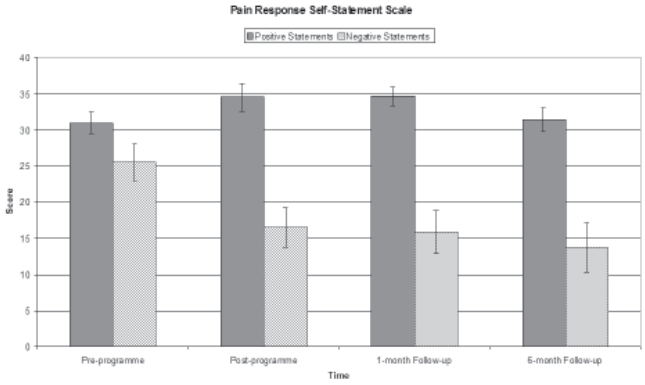
Graph 1



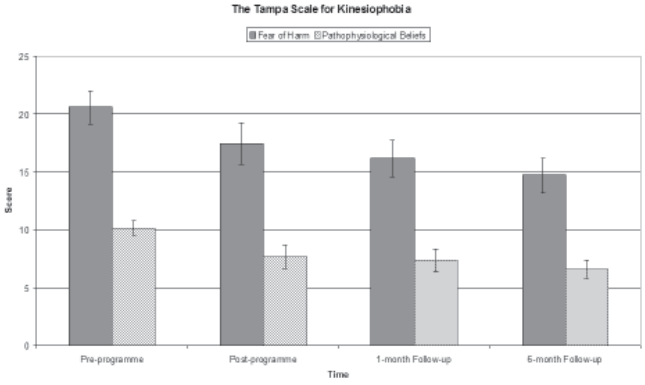
Graph 2



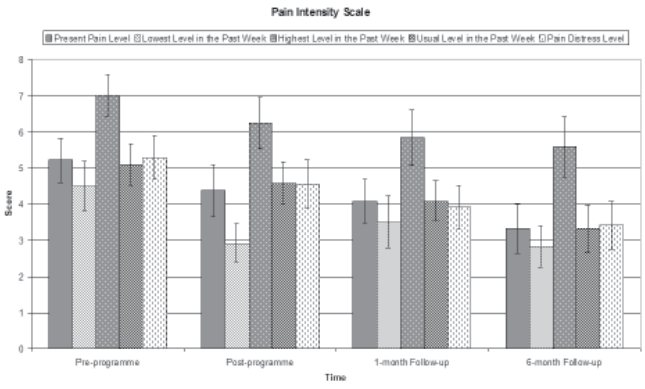
Graph 3



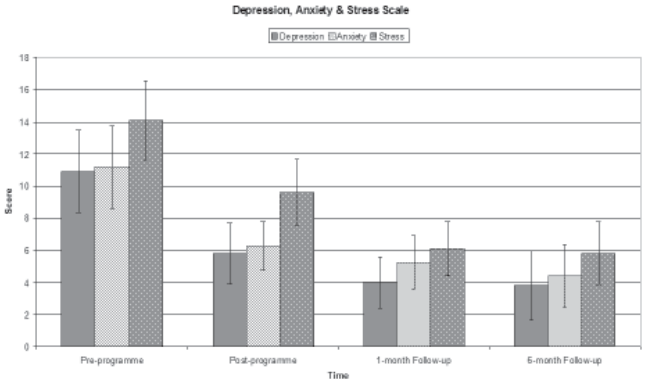
Graph 4



Graph 5



Graph 6



Effect of Completeness of Data

SPANOVA yielded a significant main effect of completeness of data on self-efficacy, $F(1, 27) = 6.21$, $P = 0.019$, indicating that patients who completed the questionnaires for all 4 time points were significantly more confident in performing activities despite pain compared to patients who did not complete the questionnaires for all 4 time points. No other significant main effects of completeness of data on other measures were documented. In addition, no significant interaction effects between completeness of data and time were documented.

CBT Programme vs Pacing Programme

Table 5 and Figure 2 show a summary of the results comparing full group CBT and group pacing programme.

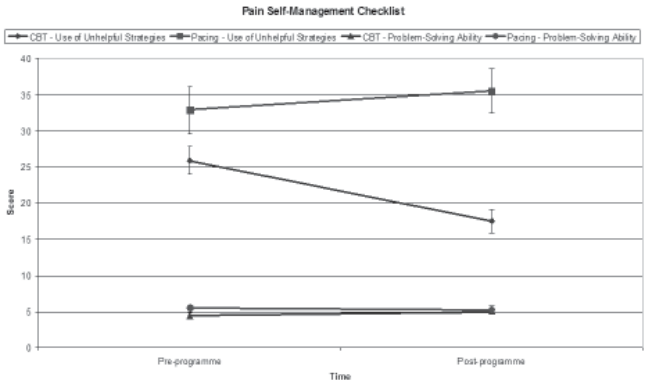
The main effect of time on use of unhelpful strategies was not significant, however, the main effect of programme type was significant, $F(1, 35) = 13.09$, $P = 0.001$. The interaction of time and programme type was also significant, $F(1, 35) = 13.67$, $P = 0.001$. No significant main effects of time or

Table 5. Results of the CBT Programme and Pacing Programme from Pre-programme to Post-programme

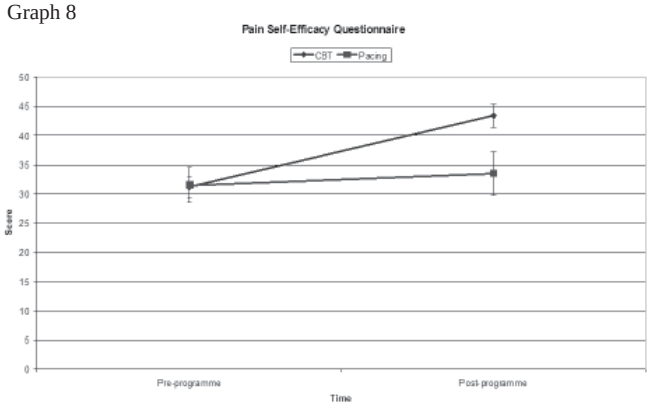
	CBT Programme					Pacing Programme				
		Pre-programme		Post-programme			Pre-programme		Post-programme	
	N	Mean	SD	Mean	SD	N	Mean	SD	Mean	SD
Pain Self-Management Checklist										
Use of Unhelpful Strategies	29	25.86	10.32	17.52	8.58	8	32.88	9.43	35.50	8.75
Problem-Solving Ability	29	4.48	1.82	5.03	1.78	9	5.44	1.33	5.22	1.86
Pain Self-Efficacy Questionnaire										
Self-Efficacy	29	31.17	10.12	43.43	10.57	9	31.56	8.93	33.56	11.08
Pain Intensity Scale										
Present Pain Level	29	5.29	2.17	4.22	2.31	9	6.78	1.79	6.11	2.47
Lowest Pain Level in Past Week	29	4.38	1.97	3.21	2.04	9	5.33	2.45	4.56	1.74
Highest Pain Level in Past Week	29	7.24	1.79	6.90	2.06	9	8.78	1.20	7.89	1.45
Usual Pain Level in Past Week	29	5.38	1.76	4.81	1.74	9	7.33	1.32	7.33	1.94
Pain Distress Level in Past Week	29	5.53	1.79	4.36	2.01	9	6.78	2.64	6.78	2.49

Fig. 2. (Data from Table 3) – CBT and pacing over 2 time points (pre- to post-programme).

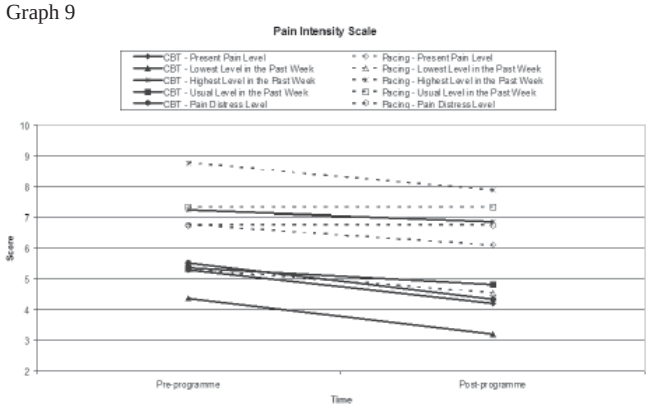
Graph 7



Graph 8



Graph 9



programme type, or interaction effects between the two on problem solving ability, were observed.

A significant main effect of time on self-efficacy was observed, $F(1, 36) = 14.63$, $P = 0.001$. The main effect of programme type was not significant. However, the interaction effect of time and programme type was significant, $F(1, 36) = 7.57$, $P = 0.009$.

The main effect of time on present pain level, highest pain level in the past week, usual pain level in the past week, and pain distress level in the past week was not significant, however, the main effect of time on lowest pain level in the past week was significant, $F(1, 36) = 8.27$, $P = 0.007$. The main effect of programme type was significant for present pain level, highest pain level in the past week, usual pain level in the past week, as well as pain distress level in the past week, $F(1, 36) = 5.38$, $P = 0.026$, $F(1, 36) = 4.35$, $P = 0.044$, $F(1, 36) = 13.97$, $P = 0.001$, and $F(1, 36) = 7.19$, $P = 0.011$, accordingly. Decreases in present and usual pain levels, as well as, pain distress levels from pre-programme to post-programme were larger for the CBT programme compared to the pacing programme. However, decreases

in highest pain level were larger for the pacing programme than for the CBT programme. No significant interaction effects between time and programme type on pain intensity and pain distress levels were documented.

Discussion

Results reported by participants in our full group CBT programme are consistent with findings from numerous studies[1,3,23] of the short-term and long-term benefits of group CBT programmes.[1,3,24,25] Results on long-term benefits were, however, calculated based on only the sample size of (n = 11). Although an approximated 20% attrition rate over a 6-month period is reported by some studies,[26] we recognise that the attrition rate in our programme in terms of follow-up after the programme is higher. One possible explanation for the high attrition rate is cultural differences in the importance attributed to research and follow-up. Local patients often times find questionnaires tedious and time consuming to fill out and as such, the rate of attrition may have increased. Another possible explanation is the lack of a system implemented by our team of service providers to follow-up with participants whom are unable to make follow-up sessions. A better system for following up with programme participants in future programmes, e.g. house calls and telephone interviews, can be implemented to ensure a reduction in the attrition rate for our programmes.

There are few studies done to show the efficacy of brief group CBT programmes like our group pacing programme. A 2-session programme for patients with temporomandibular disorders[27] produced no observed benefits at 3 months. Conversely, a programme with 6 individual sessions but still considered a brief CBT programme was able to produce results at 4 months.[28] This is somewhat consistent with our findings that more intensive and detailed CBT programmes produce greater short-term benefits than brief CBT programmes. It is suggested by some[29,30] that there is a need to determine if patients who fail to respond well to brief group CBT programmes will benefit from a more intensive therapy like the full group CBT programme which is well worth considering in our local context. A comparison of the differences in the 2 groups may help to determine which aspects of the programme potentially contributed to the better results in the full group CBT programme. The group pacing programme did not have the continued intensity provided by the group CBT programme. The group CBT programme also covered more coping strategies which had been mentioned in the earlier part of this article. Another explanation could be that the more time allotted to group CBT programme allowed for the service providers to play a more supportive role towards the patients with monitoring, addressing concerns and the ensuring of patients' understanding of the concepts taught during the programme. Finally, the intensity of the full group CBT programme also provided opportunities to foster closer relationships between patients thus creating a more supportive and encouraging environment. There is also a need to consider the differences in the number of subjects in the 2 groups. It is possible that the small number of subjects in the group pacing programme is insufficient to produce stronger results.

There is a need to address the limitations that exist in our study. One limitation is that the treatment providers' competence and protocol adherence were not assessed via direct observation. Thus, there may be some treatment provider and content differences between programmes. The treatment providers' competence may also be a limitation to the programme. As CBT for pain management was and is still a relatively new concept in Singapore, most of the therapists had only short stints of observations and consultations with programmes that are well established such as those in the Royal Northshore Hospital in Sydney and Selayang Hospital in Malaysia. The programmes were delivered by 2 psychologists, 1 with an MA in applied psychology and another with honours in psychology. The materials used throughout the programmes as well as the content of the programmes remained unchanged. However, there were no measures implemented to ensure uniformity in presentation between treatment providers. There is also a need to mention a possible confounding factor to the results of the group pacing programme which was the language barrier. Three out of the 10 patients who attended the group pacing programme were unable to converse effectively in English and required interpretations during the programme as well as when filling out the questionnaires. Although there were no significant results when these 3 patients were separated from the other 7 patients, they may not have experienced the full benefits of the programme as all programmes were conducted in English. Lastly, the sample size is small and therefore the findings are difficult to generalise to all patients with chronic pain in our local context. There is also the issue of cultural and language limitations as all programmes were conducted in English and it is unclear if Mandarin or dialect speaking patients would derive the same benefits from the programmes should they be delivered in Mandarin or in local dialects. Further studies would need to be conducted in the future when our services extend to Mandarin-speaking programmes as well.

Conclusion

There is a paucity of literature on the use of cognitive behavioural therapy in the treatment of chronic pains in Asian populations. The preliminary results in this paper provide some evidence supporting the efficacy of CBT techniques in chronic pain management. Groups of skills are highly effective in managing chronic pain. CBT therapists can

help by showing sufferers how to recognise and change negative ways of thinking and behaving. This allows them to be less affected by moods swings and to enjoy life more, even if they still have pain.

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