GAVIN PUBLISHERS

OPEN ACCESS

Chronic Pain and Management Journal

Bicego A, et al. Chron Pain Manag 5: 135.

DOI: 10.29011/2576-957X.100035

Research Article

Psychological Interventions Influence Patients' Attitudes and Beliefs about their Chronic Pain: A 6-Month Follow-up

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Citation: Bicego A, Remy H, Diep AN, Donneau AF, Faymonville ME, et al. (2021) Psychological Interventions Influence Patients' Attitudes and Beliefs about their Chronic Pain: A 6-Month Follow-up. Chron Pain Manag 5: 135. DOI: 10.29011/2576-957X.100035

Received Date: 11 March, 2021; **Accepted Date:** 19 March, 2021; **Published Date:** 24 March, 2021

Abstract

Background and Aim: Chronic pain is a complex phenomenon influenced by biological, psychological and social factors. The assessment of treatment programs is mandatory in order to sustain a good quality of life. Therefore, this non-randomized study aimed to assess the 6-month follow-up effects in a tertiary pain center of our clinical practice.

Methods: Biopsychosocial-based group treatments investigated pain perception self-assessment scale (NRS), Hospital Anxiety and Depression Scale (HADS) and the Survey of Pain Attitudes-35 (SOPA-35) questionnaires in chronic pain patients. Ninety-one patients were assigned to receive a 6 group-sessions of self-hypnosis/self-care (n=23) or 6 group-sessions of self-hypnosis/self-care combined with 8-10 group-sessions of psychoeducation (n=68). Questionnaires were administrated before and after treatment and at 6-month follow-up.

Results: Our main results showed a significant effect of both treatments on control, disability and medical cure of the SOPA-35 subscales as well as a significant effect on anxiety and depression levels. The subscale solicitude of the SOPA-35 showed a significant decrease only at 6-month follow-up. Furthermore, all other significant effects observed lasted at 6-month follow-up.

Discussion: The present findings are encouraging as they show remaining treatment effects after group interventions, meaning that even without monthly support, the patients seem to be able to apply acquired strategies in their daily life. In a context of socio-economic crisis, it is essential to develop approaches with a long-term effectiveness combined with a low cost for patients.

Keywords: Self-hypnosis; Self-care; Psychoeducation; Chronic pain; Follow-up

Abbreviations: ACT: Acceptance and Commitment Therapy; CBT: Cognitive Behavioral Therapy; CHU: Centre Hospitalier Universitaire; HADS: Hospital Anxiety and Depression Scale; NRS: Numerical Rating Scale; SOPA-35: Survey of Pain Attitudes-35; WLC: Waiting List Control Group

Introduction

Chronic pain is a complex entity characterized by prolonged and persistent pain (lasting at least 3 months beyond the expected healing period of tissue pathology) [1] involving biological, psychosocial, and socio-professional factors that affect the patients, their loved ones, and society in many ways. Currently, chronic pain remains a challenge for physicians and it has become clear that its management has to focus not only on biological but also on non-pharmacological approaches centered on psychological factors related to this particular condition [2]. Chronic pain has been typically linked to anxiety and depression [3]. In addition, when pain becomes persistent, patients may alter their previously held cultural or personal beliefs and attitudes towards pain to form views that are more consistent with their persistent pain experience. In those patients, unhelpful pain beliefs such as fear-avoidance beliefs, catastrophic thought processes, and the belief that pain necessarily results from tissue damage are more likely observed [4,5]. Several studies and meta-analyses have shown the effectiveness of non-pharmacological approaches to improve chronic pain management and appealed for further studies to assess combinations of pain treatments (i.e., hypnosis and Cognitive Behavioral Therapy (CBT), etc.) [2,6-9]. As a consequence, multidisciplinary approaches based on the biopsychosocial model of pain have shown to be the most efficient way to manage chronic pain [10].

In our Tertiary Interdisciplinary Algology Department of the University Hospital of Liege (Belgium), we aim at assessing non-pharmacological treatments such as self-hypnosis/self-care and self-hypnosis/self-care combined to psychoeducation. The aim of psychoeducation is to enhance adaptive coping by informing the patients about pain physiological mechanisms as well as the various consequences that can result from chronic pain such as emotional distress and alterations in cognition and behavior [11,12]. Psychoeducation is a CBT-based approach. The principal tool used is the reformulation in order to allow the patients to understand every step of the process and how it differs from what they had previously learned. Essentially, the tools that are used are: information about chronic pain mechanisms, reformulation of chronic pain beliefs, learning about the strategies of coping and reinsurance to enhance self-confidence [12]. A randomized study compared an online psychoeducation pain management intervention to an online mindfulness-based cognitive therapy (both interventions consisted in 12 sessions during 6 weeks) [13]. Results showed that both groups of patients (n=124, all-type of chronic pain) had significant decreases in pain interference, pain acceptance and catastrophizing and that these improvements were maintained at 6-month follow-up. Patients in both groups also showed increased subjective well-being [13]. Another randomized study compared the efficacy of psychoeducation to usual care in 216 patients with fibromyalgia at 12-month follow-up [14]. The psychoeducation program consisted in 9 sessions over a period of 2 months during which several themes were discussed: causes of fibromyalgia, pharmacological and non-pharmacological treatments, psychological factors related to chronic pain and repercussions on behavior and social context. In the psychoeducation group, autogenic training was also delivered consisting mostly of relaxation exercises. Results showed that the psychoeducation group had a better functional status (i.e. reduced physical impairment, days not feeling well, fatigue, anxiety and depression) at 12-month follow-up compared to the patients who had received usual care [14].

Self-hypnosis/self-care treatment is an intervention treatment developed by one of the co-author (M-E.F.) based on her clinical experience with chronic pain patients. This treatment consists in the combination of both self-care technique and self-hypnosis learning. Self-care is an empowerment intervention based on several strategies aiming to relearn to the patients to be actors rather than observers of their life condition. The distinctive feature of self-care is that this intervention is centered on emotions, cognitions and behaviors rather than on the pain problematic. During these group sessions, the therapist reviews the difficulties patients have had implementing the strategies given in the previous session. In addition to the strategies delivered to patients, self-hypnosis training was also proposed. The goal is to enable the patients to utilize hypnosis when they see suited.

Hypnosis is defined by the American Psychological Association as a "state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion" [15]. Furthermore, it is characterized by three components: absorption is the tendency to become completely involved in a perceptive or imaginary experience; dissociation corresponds to a mental separation of components of behaviors that normally would be processed together; and suggestibility is the tendency to conform to the

suggestions given and to suspend one's critical judgment [16]. A hypnosis session is often conducted in the same way: the therapist begins by an induction and then uses suggestions. An induction consists of amplifying the person's level of attention while decreasing the person's awareness of their environment [17]. The suggestions, on the other hand, is more of an indirect instruction aiming at modifying perceptions, sensations and cognitions in a precise goal [18]. Self-hypnosis is attained when the patient self-induces in hypnosis. The full description of the hypnosis exercise is available in the method section. As mentioned above, hypnosis has been proven to be an effective tool in improving the quality of life of patients suffering from chronic pain [19]. Indeed, a non-randomized study (n=22) [20] showed that self-hypnosis training (10 sessions, analgesia and comfort suggestions) compared to progressive muscle relaxation (10 sessions) significantly decreased overall and daily pain intensity and that the decrease in daily pain intensity remained significant at 3-month follow-up [20]. Moreover, Tan et al. randomized 100 low back pain patients to either 8-sessions of self-hypnosis training or 8-sessions of biofeedback [21]. The results showed that patients in the self-hypnosis training group had significant decreases in pain intensity and that this decrease persisted at 6-month follow-up compared to the biofeedback group [21]. In a recent randomized study [22], authors investigated whether hypnosis would enhance pain education in non-specific chronic low back pain patients (n=100). Patients were randomized into two groups: the first group only received pain education (n=50) while the second group received pain education combine to self-hypnosis training (n=50). Results showed that compared to the group who received only pain education, patients who received combination of pain education and self-hypnosis had significantly reduced "worst pain intensity" after the end of the treatment and this improvement lasted at 3-month follow-up, decreased disability post-treatment and decreased catastrophizing only at 3-month follow-up [22].

Furthermore, in a previous non-randomized clinical report including 527 chronic pain patients, we demonstrated the relevance of combining self-hypnosis and self-care techniques in the improvement of pain and the positive effects on psychological factors such as anxiety, depression, pain interference and overall quality of life, in addition to a cost-effectiveness benefit [23]. Moreover, we showed, in an earlier non-randomized clinical study, including 415 chronic pain patients, that non-pharmacological approaches allowed chronic pain patients to evolve from passive coping strategies to active coping strategies [24]. Particularly, patients significantly increased their sense of control over pain (considered to be an active coping strategy), decreased their search for medical cure, and reduce their external attribution of pain in the self-hypnosis/self-care group [24]. Even though these results are encouraging, there is still a lack of longitudinal data about the efficacy of these group interventions. Indeed, one of the main goal of clinical programs, especially in chronic pain, is to allow long-lasting effects of the proposed treatments. Consequently, the aim of this retrospective non-randomized clinical uncontrolled study is to assess whether the potential change in attitudes, beliefs, anxiety, depression and pain intensity persists for 6 months after the end of self-hypnosis/self-care learning program; the addition of psychoeducation was exploratory.

Materials and Methods

Population

Ninety-one chronic pain patients who attended the Interdisciplinary Algology Department of the University Hospital of Liège (Belgium) from September 2008 to January 2013, were included in this study. Pain was considered to be chronic if it exceeded 3 months [25]. Only patients on stable pharmacological medication during the last four months before the screening were allowed to participate in the study. As the present data represents the clinical work of our tertiary pain center, no inclusion or exclusion criteria were determined and no ethical comity approval was needed, as such patients enrolled voluntary and no consent to participate was signed.

Design and Procedure

The patients were introduced to two different therapeutic interventions, conducted by therapists: (i) self-hypnosis combined with self-care learning (6 sessions) or (ii) self-hypnosis combine with self-care learning (6 sessions) plus psychoeducation (8-10 sessions). The method used was similar to the previously published studies by Vanhaudenhuyse et al. [23,24]. The clinical intervention included five phases : (1) an initial screening phase during which the algologist (i.e. a medical doctor specialized in pain management) elaborated an appropriate pain diagnosis, checked if pain treatment was stable and proposed the patient as suitable for a multidisciplinary approach, (2) a baseline pre-treatment assessment of patients' health using questionnaires administered by a nurse (T1), (3) a group intervention delivery phase (treatment), (4) a post-treatment assessment of patients' health using the same questionnaires conducted by a nurse (T2), and (5) a final assessment at 6 months after the end of the treatment delivery phase (T3). Between phases 1 and 2, patients had to meet all experts of the pain team encompassing the algologist, nurses, psychologist and physiotherapist. Once the patients had met each expert, pain diagnosis was elaborated based on discussion during weekly multidisciplinary meetings. The multidisciplinary

team allocated the patients to a treatment group based on their physical and psychological conditions, individual pain history, daily functioning as well as previous treatments experienced by the patients. The patients were, thus, included in a treatment group. Psychoeducation was systematically proposed to patients when the multidisciplinary team considered that a supplementary information about the mechanisms of chronic pain was necessary. Preferences about the type of treatment approach were also discussed with the patients during the psychological evaluation by our pain psychologist. The patients' agreement with approaches proposed by the team and patients' agreement to actively participate and complete questionnaires at each time point (T1, T2 and T3) was mandatory. We here assessed the evolution of the patients according to time (post-treatment-T2, and 6-month follow-up-T3) and interventions (self-hypnosis/self-care learning and self-hypnosis/self-care plus psychoeducation) by means of pain Numerical Rating Scale (NRS), Hospital Anxiety and Depression Scale [26] and Survey of Pain Attitudes-35 [27]. These scales are detailed below.

Self-hypnosis/self-care learning was conducted by two psychologists (N.M. and I.S.) and a pain specialist (algologist, M-E.F.), all were also experienced in clinical hypnosis. The principle of self-care was to teach the patients to take care of themselves in their everyday life through concrete tasks. The objective was to place the patients in an active role in the management of their chronic pain, as well as to reactivate and amplify the patients' awareness of the positive experiences encountered every day. All of the proposed tasks focused on the patients' general well-being rather than on the problem of pain. The following exercises were proposed: adjusting expectations of self, changing the patients' self-narrative, strengthening self-esteem, observing and readjusting the social roles in which the patients' are, identifying limits and needs, identifying situations and feelings of powerlessness, accepting the impossibility of controlling everything, differentiating self from illness. These exercises were explained and discussed in groups of 8 patients and were given as homeworks'. Patients were invited to keep a daily diary in which they could keep track of the facilities and difficulties of daily task application that would be discussed during each new session. At the end of the session, a 15-min hetero-hypnosis exercise was conducted by the hypnotherapist with the group of patients. They also received individual CDs containing the hypnosis exercise from the session and were invited to perform this exercise on a daily basis in order to attain self-hypnosis. Five different hypnosis exercises were given. For all the exercises the hypnotherapist first invited patients to take a moment to find a comfortable position, then she continued with the hypnotic induction: visual fixation and/or breathing attention focalization. The first exercise, named "Soothing white clouds", included suggestions about relaxation, positive body sensations and invitation to observe a sunrise and a beautiful landscape, while relaxing in a white cloud chair [28]. The second exercise was a safe place suggestions based hypnotic script with suggestions of comfort, safety and well-being. The third exercise was centered on healing sleep suggestions based on an imaginary garden of dreams. The two last exercises were centered on analgesia suggestions. The first session being an introduction, no exercise was realized. The aim of these exercises were to increase comfort, sleep quality, and to decrease pain sensation. The goal of listening to the CDs was, at the end of the treatment, to help the patients to self-induce hypnosis. Each group consisted of 8-10 patients. In total, the patients received 6 sessions of two hours at five-week intervals.

Self-hypnosis/self-care combined with psychoeducation was conducted by the three previously mentioned therapists. Psychoeducation was conducted by the two psychologists (N.M. and I.S.). Psychoeducation is a cognitive-behavioral approach that aimed to improve self-management capacities and coping processes of patients regarding their chronic pain. This intervention involved supportive and group discussions. These discussions aimed to empower the patients to become active participants in their own treatment, and to provide them with a comprehensible model of pain mechanisms, an understanding of the rationale for pharmacological, physical and psychological therapy, and an acceptable rationale for making lifestyle changes. The aim of psychoeducation is, thus, to enhance adaptive coping by informing the patients about pain physiological mechanisms as well as the interactions existing between the emotional distress, altered cognitions and behaviors. Each group included 8-10 patients who received 8-10 psychoeducation weekly sessions of two hours and after 6 sessions of self-hypnosis/self-care of two hours at five-week intervals.

Data Collection

General information was only acquired at pre-treatment (T1): medical and sociodemographic information such as age, sex and diagnosis were collected.

The following questionnaires were administered in the pre- (T1), post- (T2) intervention as well as at 6-month follow-up (T3):

1. The Numerical Rating Scale (NRS) was used to assess the intensity of pain, as subjectively perceived by the patients, on a scale ranging from 0 (no pain) to 10 (pain as intense as you could imagine). In this study, the patients were asked to assess the pain felt during the past four weeks.
2. The Hospital Anxiety and Depression Scale (HADS [26]) is composed of two subscales (one for anxiety and one for

depression), each of which comprises seven items. The patients rated the items on a four-point (0-3) response category, thereby resulting in scores ranging from 0 to 21 for each subscale. Scores of 0-7 are considered to be within the normal range; scores of 11 and higher indicate the probable presence of a mood disorder (i.e. 11-15: moderate cases; 16 or higher: severe cases); and scores of 8-10 are only suggestive of the presence of mood disturbance. The HADS minimizes the recording of somatic symptoms; hence, allowing the measurement of anxiety and depression symptoms in patients with comorbid physical illnesses.

3. The Survey of Pain Attitudes-35 (SOPA-35 [27]) was used in order to identify and monitor pain-related beliefs, and is composed of 7 subscales: (a) Disability measures the belief that one is disabled by pain, (b) Harm assesses the belief that hurt signifies physical injury, (c) Medication assesses the extent to which a patient believes that medication is an appropriate treatment for his/her chronic pain, (d) Solicitude assesses the belief that it is the responsibility of others to assist the patient with his/her pain experience, (e) Medical cure assesses the extent to which a patient believes in a medical cure for his/her pain problem, and that it is the responsibility of the doctor to reduce or cure the pain problem, (f) Control measures the sense of control that the patient experiences over his/her pain, (g) Emotion assesses the degree to which the patient believes that his/her emotions impact his/her pain. Each subscale is scored from 0 to 20: the higher the score the more the relative belief is endorsed.

Statistical analysis

First, descriptive statistics were conducted to examine the frequencies of qualitative variables. Normality of the distribution, central tendencies (mean or median) and dispersion (standard deviations or interquartile ranges) of quantitative variables were examined. If normality was assumed for the distribution of the quantitative variable, means and standard deviations were reported. Reversely, medians and interquartile ranges were presented. Linear mixed models were applied to examine the presence of significant differences in the mean scores of the ten dependent variables (SOPA-35, NRS, HADS) across three time points and two groups, namely self-hypnosis/self-care and self-hypnosis/self-care/psychoeducation. Before that, Levene's test of homogeneity of variance and Shapiro-Wilk normality test of residuals were performed to check assumptions of linear mixed models. If these assumptions were violated, a robust heteroscedastic estimation based on the 20% trimmed means [29] was performed. Subsequently, sex, age, and diagnosis type (polyalgia, chronic pain syndrome, fibromyalgia, back pain, neuropathic pain and headache) were added in the model as potential confounding factor to explore if there were significant changes of the main effect and interaction effects of group and time effect. Post-hoc comparison using Bonferroni correction was conducted on the estimated marginal means of the significant factors. Results were considered as significant at the 5% critical level ($p < 0.05$). The analyses were conducted with the R software [30].

Results

Population

Ninety-one patients with a mean age of 50.60 ± 10.09 years participated in the present study. Those aged 41-50 (n=28, 30.77%) and 51-60 (n=32, 35.16%) were the largest groups. There were 23 participants (25.27%) assigned to the self-hypnosis/self-care group and 68 (74.73%) to the self-hypnosis/self-care/psychoeducation group. The majority of the participants were females (n=76, 83.51%). Regarding the diagnosis, polyalgia had the most respondents (n=25, 27.47%), followed by chronic pain syndrome (n=23, 25.27%), fibromyalgia (n=17, 18.68%), back pain (n=14, 15.38%), and neuropathic pain and headache (n=12, 13.19%). Detailed information regarding the socio-demographics of the participants is presented in Table 1.

Variables	Categories	Self-hypnosis/self-care (n=23) Number of patients (%)	Self-hypnosis/self-care + psychoeducation (n=68) Number of patients (%)	Total (%)
Age group (Range: 25-77)	21-30	2 (8.7)	1 (1.47)	3 (3.30)
	31-40	3 (13.04)	9 (13.24)	12 (13.19)
	41-50	5 (21.74)	23 (33.82)	28 (30.77)
	51-60	9 (39.13)	23 (33.82)	32 (35.16)
	61-70	2 (8.7)	11 (16.18)	13 (14.29)

	71-80	2 (8.7)	1 (1.47)	3 (3.30)
Sex	Male	7 (30.43)	8 (11.76)	15 (16.48)
	Female	16 (69.57)	60 (88.24)	76 (83.52)
Diagnosis	Polyalgia	5 (21.74)	20 (29.41)	25 (27.47)
	Chronic pain syndrome	4 (17.39)	19 (27.94)	23 (25.27)
	Fibromyalgia	1 (4.35)	16 (23.53)	17 (18.68)
	Back pain	5 (21.74)	9 (13.24)	14 (15.38)
	Neuropathic pain and headache	8 (34.78)	4 (5.88)	12 (13.19)

Table 1: Socio-demographics at pre-treatment (T1) of all patients (N=91).

Assumption checking

To check assumption of linear mixed models, Levene's tests of homogeneity of variance and Shapiro-Wilk normality test of residuals were performed. The results showed no violation of homogeneity. However, in the case of Emotion SOPA-35 subscale, NRS pain, and depression HADS subscale, the residuals demonstrated a non-normal distribution. Therefore, a robust estimation was employed.

Descriptive statistics

Summary of the ten variables at each time point and in each group are presented in Table 2. The result showed that no significant difference was detected at baseline pre-treatment between groups (p=0.518).

	Self-hypnosis/self-care (n=23) (M±SD/median[interval])			**Self-hypnosis/self-care + psychoeducation (n=68) (M±SD/median[interval])**			**Both groups (n=93) (M±SD/median[interval])**		
	T1	**T2**	**T3**	**T1**	**T2**	**T3**	**T1**	**T2**	**T3**
Pain intensity (NRS)	5 [3.88;7]	5 [2.50;7]	5 [2.50;7]	5 [3.50;7.50]	4.50 [2;6]	5 [2.50;6.50]	5 [3.50;7]	5 [2;6.50]	5 [2.50;7]
Hospital Anxiety and Depression Scale [26]									
Anxiety Depression	10 [7;12] 10 [7;14]	6 [5;9] 8 [6;11]	7 [5;8] 8 [6;12]	10 [8;7] 11 [7;15]	8.50 [6;11] 9.50 [6;13]	9 [5;11] 8.50 [5.25;13]	8.50 [6;11] 9.50 [6;13]	9 [5;11] 8.50 [5.25;13]	10 [8;13] 11 [7;15]
Survey of Pain Attitudes – 35 [27]									

Control	12.27 ±2.41	11.3 ±2.7	11.09 ±2.52	12.57 ±2.52	10.91 ±2.35	11.19 ±2.02	12.5 ±2.49	11.01 ±2.43	11.17 ±2.14
Disability	13 [11;15]	12 [10;15]	12 [10;14]	13.50 [12;16]	12.50 [10;15]	13 [11;15]	13 [12;16]	12 [10;15]	13 [11;14]
Harm	12.77 ±2.83	11.61 ±3.03	11.91 ±2.59	11.91 ±2.27	11.72 ±2.25	12.19 ±2.26	12.12 ±2.43	11.69 ±2.45	12.12 ±2.34
Emotion	14.45 ±2.81	13.91 ±3.8	14.09 ±2.87	14.57 ±2.8	13.85 ±3.36	13.99 ±3.25	14.54 ±2.79	13.87 ±3.46	14.01 ±3.14
Solicitude	7.64 ±4.76	7.61 ±4.36	6.7 ±5.27	9.25 ±5.43	8.47 ±5.38	7.39 ±5.20	8.86 ±5.29	8.25 ±5.14	7.21 ±5.19
Medical Cure	11.41 ±2.48	9.87 ±2.72	10.04 ±3.1	10.19 ±2.92	9.26 ±2.53	9.07 ±2.94	10.49 ±2.85	9.42 ±2.57	9.42 ±2.57
Medication	8.27 ±2.49	7.57 ±2.92	7.7 ±4.09	7.97 ±2.80	7.49 ±2.67	7.57 ±2.44	8.04 ±2.71	7.51 ±2.72	7.6 ±2.93

M: Mean; SD: Standard Deviation; NRS: Numerical Rating Scale; T1: pre-treatment; T2: post-treatment; T3: 6-month follow-up

Table 2: Patient Study Outcomes.

Effects of groups over time

Analysis of the effects of groups, times and interaction between those two parameters for each outcome revealed that:

- **SOPA-35 subscales:** The analysis showed no significant differences in the seven variables of SOPA-35 among the two groups. However, a significant effect of time was found in the case of Control ($p<0.001$), Disability ($p=0.001$), Solicitude ($p<0.01$), and Medical cure ($p=0.001$). The interaction effect between groups and time was found to be non-significant.
- **NRS pain:** There were no significant differences between the two groups over time regarding the mean scores of NRS pain.
- **HADS:** There were no significant differences between the two groups regarding the mean scores of Anxiety, and Depression. However, a significant effect of time was found for Anxiety ($p<0.001$) and Depression ($p<0.001$).

Additional statistical investigations showed that considering sex, age, and diagnosis group in the previous analysis did not modify previous observations (Table 3).

Dependent variables	p-value	Time	Group	Time*Group
Pain intensity (NRS[b])	Raw Adjusted[a]	0.08 0.08	0.56 0.35	0.4 0.01
Hospital Anxiety and Depression Scale [26]				
Anxiety	Raw Adjusted[a]	<.001 <.001	0.22 0.75	0.23 0.23
Depression[b]	Raw Adjusted[a]	<.001 <.001	0.49 0.67	0.27 0.27
Survey of Pain Attitudes-35 [27]				

Control	Raw	<.001	0.97	0.62
	Adjusted[a]	<.001	0.55	0.61
Disability	Raw	0.001	0.29	0.82
	Adjusted[a]	0.001	0.73	0.82
Harm	Raw	0.2	0.86	0.35
	Adjusted[a]	0.2	0.6	0.35
Emotion[b]	Raw	0.08	0.9	0.99
	Adjusted[a]	0.07	0.2	0.9
Solicitude	Raw	<.01	0.42	0.69
	Adjusted[a]	<.01	1	0.69
Medical cure	Raw	0.001	0.09	0.67
	Adjusted[a]	0.001	0.19	0.67
Medication	Raw	0.09	0.67	0.87
	Adjusted[a]	0.09	0.77	0.87

NRS: Numerical Rating Scale; [a]Adjusted for the effect of Gender, Age, and Diagnosis; [b]Robust estimation was employed.

Table 3: The effect of group, time, and group by time on dependent variables controlling for sex, age, and diagnosis.

As no significant difference was found between groups, post-hoc analyses only concerned time as the main effect. Multiple comparisons using Bonferroni as correction method revealed that over time, there was a significant decrease in the mean scores of five variables, i.e. Control, Disability, Medical cure (SOPA-35), Anxiety, and Depression (HADS), measured at T1 compared with that at T2 and T3. For Solicitude (SOPA-35), there was only a significant difference in the estimated marginal means between T1 and T3. The results can be found in Table 4.

	Mean difference[a]	**SE**	**p-value**
Questionnaires			
Hospital Anxiety and Depression Scale [26]			
Anxiety			
T1-T2	2.317	0.395	<.001
T1-T3	2.145	0.395	<.001
T2-T3	-0.173	0.395	1
Depression			
T1-T2	1.983	0.459	<.001
T1-T3	1.580	0.459	<.01
T2-T3	-0.403	0.459	1
Survey of Pain Attitudes -35 [27]			
Control			
T1-T2	1.331	0.319	<.001
T1-T3	1.212	0.319	0.001
T2-T3	-0.119	0.319	1
Disability			

T1-T2 T1-T3 T2-T3	1.132 0.936 -0.196	0.323 0.323 0.323	<.01 <.01 1
Solicitude			
T1-T2 T1-T3 T2-T3	0.556 1.567 1.011	0.452 0.452 0.452	0.66 <.01 0.08
Medical cure			
T1-T2 T1-T3 T2-T3	1.130 1.091 -0.039	0.362 0.362 0.362	<.01 <.01 1
SE: Standard Error; [a]Main differences of estimated marginal means.			

Table 4: Multiple comparison of evolution of anxiety, depression, control, disability, solicitude, and medical cure, over three time points.

Discussion

The aim of this retrospective non-randomized un-controlled study was to assess our tertiary pain center clinical practice 6-month follow-up effects of biopsychosocial-based group treatments. We found a global effect of time on different subscales of the SOPA-35 and HADS while no group effect was observed. Both treatments and the time elapsed influenced beliefs endorsed by chronic pain patients as well as emotional distress, allowing them to maintain the effects retrieved directly after the treatment at 6-month follow-up (T3). Indeed, the results displayed a significant decrease in sense of control, perceived disability, medical cure, anxiety and depression immediately after the end of treatments (T2). When comparing these pre-treatment scores (T1) to the ones patients obtained at 6-month follow-up (T3) a significant decrease was also observed meaning that patients continued to benefit from the treatments effects 6 months after the end of treatments. Nevertheless, no significant effect was displayed, for these variables between the end of the treatments (T2) and the 6-month follow-up (T3), meaning that the beneficial effects acquired directly after the end of treatments remained the same at 6-month follow-up. Solicitude (i.e. the belief that other should respond solicitously to pain) only decreased at 6-month follow-up (T3).

In contrast with a previous study using the same techniques [24], control over pain significantly decreased directly after the treatment delivery phase and remained low at 6-month follow-up. This is surprising as both self-hypnosis/self-care and psychoeducation treatments aim at empowering patients by reinforcing their sense of self-worth and enabling them to be aware of their capacity to model their pain by adopting daily changes [24]. An explanation of this discrepancy could be that, in our previous study [24], the patients from psychoeducation/physiotherapy and self-hypnosis/self-care groups had less sense of control at pre-treatment than patients included in the present study. Patients with less sense of control at baseline pre-treatment were potentially more likely to improve this coping strategy through the tasks proposed during group interventions, while the effect is probably less obvious when patients already had better developed this strategy in their daily life.

The results also revealed a decrease in feeling disabled by pain, which is in line with previous studies assessing the beneficial effect of psychoeducation [31] and self-hypnosis/self-care learning [24]. Conversely, Jensen et al. [32] have shown that at 12-month follow-up, the patients in their study sample had increased their perceived disability [32]. This difference might be explained by the difference in methods. Indeed, in their study [32], patients were invited to participate in a 3-week (5.5 days per week) multidisciplinary pain treatment program. The program encompassed occupational therapy, physical therapy, individual cognitive-behavioral psychotherapy, vocational counseling, group pain education and coping skills training, and, when indicated, the decrease of sedative-hypnotic and opioid medication. Furthermore, no hypnosis exercise was given to the patients. By its length in time, our treatment program was delivered in a more teaching manner, aiming at enabling the patients to apply the learned-strategies and hypnosis exercises on a daily basis. Each session began with a dialogue aiming at understanding how patients applied the strategies in their daily routine and if they had listened

to the CD. Our interventions had this particularity that it asked the patients to actively modify their usual way to react and manage daily routine. The discrepancy with Jensen et al. [32] might thus be explained by the difference in the treatment-program duration, the absence of hypnosis exercise and the length of follow-up (6 months vs. 12 months).

Carpenter et al. [33], investigated the efficacy of an internet-delivered CBT intervention to improve pain attitudes and beliefs using the SOPA-32 in chronic low back pain patients [33]. Patients (n=141) were either randomized in the CBT intervention group or a Waiting-List Control group (WLC). Patients in the CBT intervention group were invited to read an on-line CBT-based group during 3 weeks, while the WLC group did not have access to the on-line book. At the end of the 3 weeks, all patients had to complete measurements. Then, patients from both group were invited to all read the on-line book, the next assessment was made after 3 weeks (6 weeks since pre-treatment). Results showed significant differences between groups after the 3 first weeks but no differences were observed after 6 weeks. This means that after the first 3 weeks, patients in the experimental group had significantly increased their score in the "control" and "emotion" subscales and significantly decreased their scores in the "disability", "harm", and "medication" subscales of the SOPA-32. However, no statistical differences were found for the "solicitude" and the "medical cure" subscales. As our present results, the study of Carpenter et al. [33], highlights the fact that CBT-based treatments are effective in altering chronic pain patients' beliefs, hypothetically enabling them to adopt adaptive behaviors to the detriment of maladaptive ones.

Moreover, the decrease observed in our previous study [24] for the harm subscale of the SOPA-35 was not replicated in this sample of patients even though a slight non-significant decrease was observed for both groups between the pre-treatment and post-treatment phases. This result could be explained by the small number of patients involved in this study, which might have prevented us from uncovering the small effect.

Concerning emotional distress, our results showed a decrease in both anxiety and depression levels that were maintained at 6-month follow-up. These results are in line with previous studies centered on the use of hypnosis in chronic pain management [7,23]. Vanhaudenhuyse et al. [23] showed a decrease in emotional distress levels directly after the end of the treatment delivery phase when comparing self-hypnosis/self-care treatment to physiotherapy combined to psychoeducation [23]. Another study investigating the beneficial effects of hypnosis revealed a decrease of emotional distress at one and two-year follow-up [7]. Furthermore, Jensen et al. [34], carried-out a study in order to understand to what extend chronic pain patients (n=30, various chronic pain etiologies) were satisfied with hypnotic analgesia-based treatments and what were the beneficial side effects retrieved. Results showed that 29 patients reported being satisfied with the hypnotic treatment even when their subjective pain was not decreased. Moreover, when patients were asked to list the beneficial side effects of the hypnotic treatment, 23 (58%) out of 40 benefits were given mostly citing increase in positive affect (i.e. decreased stress, anxiety and depression) [34]. Other studies focusing on long-lasting effects of CBT showed a reduction of both anxiety and depression directly after the end of the treatment delivery phase and at 6-month follow-up [35,36]. In their study, Wetherell et al. [36] randomly assigned chronic pain patients to two group-interventions: Acceptance and Commitment Therapy (ACT) and CBT [36]. Each group consisted of 4-6 persons and the patients received 8-weekly-sessions of 90 minutes. The ACT treatment group consisted on discussions and exercises aiming non-judgmental acceptance and awareness of pain experiences, identification of valued life directions and adequate actions toward life goals supported by the patients' values [36]. The CBT intervention group focused on training patients to monitor their pain, increase pleasant daily activities, use problem solving skills and proposed progressive muscle relaxation [35]. Furthermore, our results did not reveal any changes in pain intensity. These results are in contradiction with a previous study showing that self-hypnosis/self-care yielded a decrease in pain intensity of patients, while other biopsychosocial interventions (psychoeducation and the combination of physiotherapy and psychoeducation) did not [23]. Moreover, the results of other studies seem to display a grey area concerning the beneficial effect of hypnosis upon average pain. Indeed, some results suggest a decrease in pain intensity [20] while others show no difference at pre- and post-treatment [32]. These differences could be explained by methodological factors such as hypnotic suggestions used in the treatment phase.

The absence of group effect might be explained by the fact that both groups received self-hypnosis/self-care treatment. Mind-body therapies such as hypnosis have proven their efficiency regarding pain management [37]. Furthermore, the monthly self-care strategies provided can be consider as multicomponent approach that includes combination of self-esteem training, knowing oneself needs and values, goals orienting according to needs and values. Currently, the use of mind-body therapies as a complement to more cognitive approaches are consider to be the most adequate and efficient management for chronic pain patients

[38]. In addition, we cannot disentangle the effect of self-hypnosis and self-care as the technique were combined in both groups. Future randomized studies should focus on this issue and enable a more precise understanding of the action self-hypnosis might have on self-care. Similarly, future studies are needed in order to better understand the effect of psychoeducation alone compared to self-hypnosis and/or self-care.

The present study has certain limitations. The first limitation is that the number of patients in self-hypnosis/self-care is lower (N=23) compared to that of the self-hypnosis/self-care/psychoeducation group (N=68), which prevents any generalization of the results. During the period of recruitment of this study, the clinicians allocated patients based on their experience and their interpretation of which treatment is suitable for which patient regardless of the results of the pre-treatment questionnaire. These complex recruitment procedures result in an idiosyncratic treatment groups. However, we previously showed that the population frequenting the Interdisciplinary Algology Department of the CHU of Liège [39] presents homogeneous characteristics with the population included in a larger European Survey [40]. The second limitation was the fact that no randomization was carried out. Therefore, the need for future randomized clinical trials comparing different biopsychosocial approaches is undeniable in order to improve our understanding of treatment efficiency and to enhance patient-care. The third and final limitation of our study lies in the lack of data about the number of patients who refused the treatment proposed by the multidisciplinary team, as well as the number of patients who dropped out before completing all the therapeutic sessions. Because we want to describe daily routine practice, these data would add valuable information to better describe daily clinical routine in our center.

Conclusion

In conclusion, the present findings are encouraging as they reveal a significant effect of biopsychosocial-based approaches 6 months after the end of group interventions. We can thus hypothesize that even without monthly support, the patients seem able to apply the learned strategies in their daily life. This is of importance as the goal of every therapy is to empower the patients and allow them to play an active role in their well-being and quality of life. Finally, in a context of socio-economic crisis, it is essential to develop biopsychosocial approaches with a significant effectiveness combined with a low cost for the patient (in our study maximum 16 sessions).

Acknowledgments

We thank R. Fontaine, D. Libbrecht, S. Teuwis, M. Tomasella, S. Smitz, B. Kaschten, M-C. Charles, N. Jamoulle, C. Lequarre, V. Bonhivers, L. Galloy, V. Boever, N. Bodson, V. Didderen, H. De Leval, S. Esposto for their significant help in this work. We also thank Alain Collinet for the creation of hypnosis CDs.

Funding

The study was supported by the University and University Hospital of Liège, "Plan National Cancer" of Belgium (Grant Number 138), Belgium Foundation Against Cancer (Grant Numer: 2017064) and Benoit Foundation (Bruxelles).

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