Journal of Rehabilitation and Pain Medicine

de Rooij A, et al., 2023- J Rehab Pain Med
Research Article

Does a Multidisciplinary Pain Management Treatment Improve Sleep Quality in Patients with Chronic Widespread Pain and Sleep Problems? Results from the AMS-Pain Cohort

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Received Date: 07-18-2023
Accepted Date: 07-27-2023
Published Date: 08-12-2023

Abstract

Background: Poor sleep quality is a significant concern for patients with chronic widespread pain (CWP), impacting their emotional, cognitive, and physical well-being. While there is little specific attention given to the treatment of sleep in such programs, it is possible that its ingredients, such as cognitive behavioral therapy, improving body awareness, relaxation, having a balanced daily routine, and physical activity, have a positive effect on sleep. The objectives of this study are to examine:

1. whether sleep improves after a multidisciplinary pain management treatment.
2. and to explore predictors of treatment outcome, in patients with chronic widespread pain (CWP) and sleep problems.

Methods: Data were used from pre- and post-treatment measurements of 121 patients with CWP and sleep problems, treated with a multidisciplinary pain management treatment (not specifically focusing on sleep). Mean difference in subjective sleep quality and standard outcome of multidisciplinary treatment, as measured with Pittsburg Sleep Quality Index (PSQI) and IMMPACT outcome measures, were analyzed and Cohens d were

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DOI: https://doi.org/10.37191/Mapsci-JRPM-1(3)-014

calculated. Regression models were used to assess whether pretreatment variables predicted poor improvement of subjective sleep quality post treatment.

Results: The effect size of improvement in sleep quality was small (Cohen's d=0.3) and 94% of the patients still experienced poor sleep quality after treatment (PSQI ≥ 6). Moderate effects sizes were found for pain (d=0.6), fatigue (d=0.56) and disability (d=0.53). Pretreatment poorer sleep quality, higher levels of pain related disability, psychological distress and less concern predicted poorer sleep quality post-treatment.

Conclusion: The improvement of sleep quality after following a multidisciplinary pain management treatment not specifically focusing on sleep was limited. To improve sleep, specific strategies targeting sleep (e.g., sleep education, sleep hygiene and /or cognitive behavioral therapy for sleep) may need to be included into multidisciplinary treatment. Addressing pain related disability and psychological distress, may also help to improve sleep quality.

Keywords: Chronic widespread pain; Subjective sleep quality; Multidisciplinary pain management treatment; Rehabilitation; Treatment outcome; Predictors; Cohort.

Introduction

Sleeping disorders are common among patients with chronic widespread pain (CWP), with a prevalence ranging from 75% to 96% [1,2]. Literature suggests that sleeping disorders in patients with chronic pain are related to higher levels of pain and fatigue, problems with cognitive and daily functioning, greater psychosocial distress and catastrophizing [2-9] as well as worse multidisciplinary treatment outcome [10]. Patients with CWP report that improving sleep is a high priority, in addition to improving pain and fatigue [11,12].

Multidisciplinary pain management treatment primarily focuses on learning patients to deal with pain, improving their activities in daily life and decreasing their pain-related disability [13-15]. While there is little specific attention given to the treatment of sleep in such programs, it is possible that its ingredients, such as cognitive behavioral therapy, improving body awareness, relaxation, having a balanced daily routine, and physical activity, have a positive effect on sleep [16-18].

There is some indirect evidence to support this idea: a meta-analysis conducted by Wibley, et al., [19] found that sleep disturbance is related to pain intensity via mood, pain helplessness, symptoms of anxiety and depression, negative affect, attention to pain, and fatigue-all of which are important targets of a multidisciplinary pain management treatment.

Several studies have been conducted to examine the effect of pain management treatments on sleep. While a review conducted by Bernardy, et al., [20] and the NICE guideline (2021) [21] found no effects of multidisciplinary treatment on sleep, individual results of studies varied [10-25]. This can be attributed to the heterogeneity of the patients with chronic pain and the treatments provided, as well as the selection criteria utilized in the reviews. Furthermore, it is not known which patients experience a positive effect on sleep and which do not. Insight into patient baseline characteristics

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associated with a poor treatment effect on sleep can be used to assign patients to a specific sleep treatment that is more likely to be effective. The aim of this study was to examine with.

1. whether subjective sleep quality improves after a multidisciplinary pain management treatment.
2. and to explore predictors of treatment outcome, specifically poor improvement in subjective sleep quality in patients with CWP and sleep problems.

Method

Design

The study was conducted within the Amsterdam Pain (AMS-PAIN) Cohort. Baseline and post treatment data of 121 CWP patients who experienced poor sleep quality were used. Prior to the start of the treatment, baseline (To) measurements were made. The second assessment (T1) was performed directly after treatment. This study was authorized by the ethical review board of the Slotervaart Hospital and Reade in Amsterdam. (METC number P1748). Each cohort member provided their written, informed permission.

Procedures and patients

The AMS-PAIN cohort consists of chronic pain patients whose data has been collected since September 2010 at Reade, an outpatient secondary care center for rheumatology and rehabilitation in Amsterdam, the Netherlands.

To participate in the cohort, patients had to be 18 years of age or older, have at least one chronic pain condition of the musculoskeletal system for at least three months, and have provided informed consent in order to join the cohort.

Additional selection criteria for the current study were:

(i) a diagnosis of CWP according to the American College of Rheumatology criteria (ACR) [26],
(ii) an indication for multidisciplinary treatment according to the criteria of the Dutch Consensus Report of Pain Rehabilitation - requiring patients to have limitations in daily life and/or psychosocial functioning [27],
(iii) experiencing a poor subjective sleep quality according to the Pittsburgh Sleep Quality Index (PSQI) (PSQI score ≥ 6) [28] and
(iv) following a standard multidisciplinary pain management treatment.

Exclusion criteria were:

(i) pain resulting from known specific pathology (e.g. ankylosing spondylitis); (ii) ineligible for multidisciplinary pain treatment because of a somatic disorder, social problem and/or psychiatric disorder (e.g. major depression), or because the patient was currently involved in a legal procedure that could impose a conflict of interest, was currently receiving pain treatment elsewhere, or was judged by the rehabilitation physician and/or psychologist not to be motivated for behavior change; and, (iii) insufficient control of the Dutch language to complete questionnaires.

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In this study, patients were enrolled one after the other. The recruitment period for this study lasted 18.5 months, from February 2016 to mid-August 2017.

Intervention

The multidisciplinary pain management treatment focused on learning patients to cope with pain and fatigue, improving their daily structure and reducing their pain-related disabilities. The treatment consisted of two consecutive parts. In part one a standard package of treatment was offered and consisted of the following modules:

1. neurobiological education of pain (i.e., two group sessions of 120 minutes).
2. exercising, aimed at improving body awareness during movement and relaxation (i.e., six group sessions of 60 minutes).
3. lifestyle improvement, aimed at exploring the importance of day structure, creating a balance in the day in terms of activity and relaxation, exploring the importance of good nutrition and sleep (three group sessions of 60 minutes).
4. coaching sessions by one of the members of the multidisciplinary team, aimed at bringing the lessons learned into practice and formulating treatment goals (five individual session of 60 minutes).
5. Examination by a psychologist of the cognitive, emotional, behavioral and physical repercussions of the pain that may be associated with the persistence of chronic pain (two 60-minute individual sessions).

In part II, based on the assessment of the repercussions of the pain and the personal goals and needs of the patient, the treatment was personalized to the individual patient. If indicated, patients could follow the following modules:

1. exercising (i.e., graded activity and/or re-engagement of sport).
2. relaxation.
3. structured resting in a day (max 20 min each time).
4. psychomotor therapy aimed at increasing body awareness in relation to emotions and social environment.
5. cognitive behavioral therapy and/or acceptance and commitment therapy.
6. planning aimed at optimizing day structure.
7. social work aimed at answering questions about the law and regulations concerning loss of work, to support reintegration of work or problems in the area of intimacy.

Measurements

Primary outcome measurement

Sleep quality

The Pittsburgh Sleep Quality Index (PSQI) was used to assess the quality of sleep. The PSQI is a 19-item self-report tool created to assess sleep disturbances and quality over a 1-month period.

The 19 items of the questionnaire generate seven component scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of

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sleeping medication, and daytime dysfunction. The component scores range from 0 (indicating no difficulty) to 3 (indicating severe difficulty). The sum of the seven components yields one total score. The total score varies from 0=no interference with sleep to 21=severe interference with sleep. A total PSQI score ≥ 6 distinguishes patients of having poor sleep quality, while a PSQI score of ≤ 5 indicates good sleep. The PSQI has been extensively used in numerous chronic pain samples and has proven to have sufficient psychometric qualities [28,29].

The clinical, emotional and cognitive factors described below were assessed using validated questionnaires and are widely used in pain research and have been described before by our group [30].

Secondary outcome measurements

To assess the outcome of multidisciplinary pain management treatment, IMMPACT outcome measures [31] were assessed at baseline and post-treatment, including pain (Numeric Rating Scale (NRS)) [32], fatigue (Multidimensional Fatigue Index (MFI)) [33], depression (Beck Depression Index (BDI)) [34,35], physical function (Multidimensional Pain Inventory (MPI)) [36], and disability (Pain Disability Index (PDI)) [37].

Potential baseline predictors of sleep quality post treatment

The potential predictors were chosen based on their relevance for pain rehabilitation in CWP and their possible relationship with sleep quality [13,19]. Clinical factors included: baseline pain (Numeric Rating Scale (NRS)) [32], fatigue (Multidimensional Fatigue Index (MFI)) [33], depression (Beck Depression Index (BDI)) [34,35], physical function (Multidimensional Pain Inventory (MPI) [36] and disability (Pain Disability Index (PDI)) [37]. Emotional factors included: baseline psychological distress (Hospital Anxiety Depression Scale (HADS) [38]. Cognitive factors included: baseline catastrophizing (Dutch Pain Catastrophizing Scale (PCS)) [39], general acceptance (Acceptance and Action Questionnaire (AAQ)) [40,41], general self-efficacy (Dutch General Self-Efficacy Scale (DGSS)) [42], pain related self-efficacy (Pain Self- Efficacy Questionnaire (PSEQ)) [43], and illness beliefs (Brief Illness Perception Questionnaire (IPQ)) [44].

Statistical analyses

Baseline patient characteristics were tabulated as means (SD) or medians (IQR) if data did not show a normal distribution. Using two-tailed paired T-tests (with a significance level of P 0.05), the mean differences between To and T1 scores on the outcome measures of multidisciplinary treatment and sleep quality were evaluated. Effect sizes were computed by calculating the within group Cohens d. A value of 0.2 indicates a small effect size, 0.5 indicates a medium effect size, and 0.8 indicates a large effect size. [45] Uni- and multivariable regression analyses were performed to evaluate the predictors of poor improvement in sleep quality (PSQI-total score) after multidisciplinary pain management treatment. The factors were divided into 3 groups:

1. clinical factors: pain (NRS), fatigue (MFI), interference of pain (MPI) and disability (PDI),

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2. emotional factors: psychological distress (HADS total score); and
3. cognitive factors: catastrophizing (PCS), general acceptance (AAQ), general self-efficacy (DGSS), pain related self-efficacy (PSEQ), and illness beliefs (eight subscales of the IPQ).

Assumptions of a normal distribution of residuals and homogeneity of residuals variance were visually inspected on residual plots before the analysis [46]. Firstly, the individual relationships between the predictive factors and sleep quality post treatment were examined, using simple regression models. Secondly, a preselection of predictors was done due of the small study size. This method of preselection has been described in a previous study [30]. In order to achieve this, the predictive factors were analyzed per group of related variables for both the clinical and cognitive factors, using multiple variable regression models (method enter). To avoid multicollinearity, the bivariate correlation coefficients of all pairs of determinants were calculated. One of the variables was taken out of the model when correlation coefficients r > 0.7 were discovered. The multivariable backward regression model was filled out with the predictive factors found in step 2 (multivariable regression models for each group of predictive factors) that had a P value of less than 0.20. In the final model, a factor was included if its significance was P 0.05. Age and gender were taken into account in all analyses.

Results

Study population

Out of 158 patients, a total of 121 patients were included in this study. Eight patients were excluded from the cohort study because they had a score ≤ 5 on the PSQI, 17 patients did not consent to the use of their data for research purposes and 12 patients were excluded from analyses because they had incomplete data. Baseline characteristics of the participants are shown in (Table 1). Participants were mostly women, middle aged and of Dutch ethnicity; about half of the participants experienced pain for more than 5 years.

Variable	T1	N 121
Demographics		
Age	45.84 (10.92)	
Gender (female) %	86.8	
Ethnicity %		
- Native	76	
- Immigrant of non-Western origin	13.2	
- Other	10.7	
Education %		

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- Primary	19	
- Secondary	53.7	
- High	27.3	
Pain duration %		
- 1 to 6 months	3.4	
- 6 months to 2 years	19.3	
- 2 years to 5 years	26.1	
- >5 years	51.3	
BMI	27.02 (4.82)	118
Emotional factors		
Psychological distress (HADS total score)	9.24 (4.18)	120
Cognitive factors		
Pain catastrophizing Scale (PCS)	25.61 (9.85)	
(General) Acceptance (AAQ)	43.52 (10.85)	
General self-efficacy (DGSS)	28.98 (5.98)	120
Pain self-efficacy (PSEQ)	27.22 (10.75)	
Illness beliefs (IPQ)		
- Consequences	8.29 (1.33)	
- Timeline	8.31 (1.86)	
- Personal control	4.50 (2.49)	
- Treatment control	7.00 (1.80)	
- Nature/symptoms	8.07 (1.17)	
- Concerns	7.55 (1.94)	
- Coherence	5.43 (2.54)	
- Emotional representation	7.67 (1.93)	

Table 1: Baseline characteristics of patients attending multidisciplinary treatment.
Legend: N=121 unless otherwise indicated, Values are means (SD) or percentages. SD=standard deviation. AAQ=Acceptance and Action Questionnaire, DGSS=Dutch General Self Efficacy Scale, HADS=Hospital Anxiety Depression scale, IPQ=Illness Perception Questionnaire, PCS=Pain Catastrophizing Scale.

Change in sleep quality and outcome measurements of multidisciplinary treatment.

Statistically significant improvements after multidisciplinary treatment were found for all standard IMMPACT outcome measurements of multidisciplinary treatment and sleep (Table 2). Moderate effects sizes were found for pain (d=0.6), fatigue (d=0.56) and disability (d=0.53). Improvement in subjective sleep quality was small d=0.3. In addition, 94% of the CWP patients experienced a poor sleep quality after multidisciplinary treatment according the PSQI (defined as a PSQI score of ≥ 6).

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Variable	To	T1	Mean change 95% CI	N	*P* value	Effect size
Sleep quality (PSQI)						
PSQI total score (range 0-21)	13.50 (3.96)	12.29 (4.15)	1.21 (.49 to 1.92)	121	0.001	0.3
Poor sleep quality (PSQI score ≥ 6)	100%	94.20%				
Good sleep quality (PSQI score ≤ 5)	0%	5.80%				
Secondary treatment outcome						
Pain NRS (0-10)	6.85 (1.60)	5.58 (2.21)	1.27 (.89 to 1.64)	120	0.00	0.6
General fatigue MFI (4-20)	17.90 (2.43)	16.06 (3.44)	1.84 (1.24 to 2.44)	113	0.00	0.56
Pain interference MPI (0-6)	4.26 (1.05)	3.80 (1.15)	.467 (.26 to.68)	114	0.00	0.41
Disability PDI (0-70)	41.27 (11.81)	34.48 (13.85)	6.79 (4.41 to 9.16)	114	0.00	0.53
Depression BDI (0-63)	22.96 (10.79)	19.52 (11.36)	3.43 (1.94 to 4.93)	113	0.00	0.42

Table 2: Change in sleep quality and secondary outcome measurements of multidisciplinary treatment. Legend: Values are means (SD) or percentages. SD=standard deviation. Effect size=Cohen's d. BDI=Beck Depression Index, MFI=Multidimensional Fatigue Index, MPI=Multidimensional Pain Inventory, NRS=Numeric Rating Scale, PDI=Pain Disability Index, PSQI=Pittsburgh Sleep Quality Index (PSQI).

Factors predicting a change in sleep quality

The results of the simple and multivariate linear regression analyses are shown in (Table 3). The simple regression models (column 1 of Table 3) show that negative clinical (pain and disability), emotional (psychological distress) and cognitive factors (nature /symptoms and less self-efficacy beliefs) are each individually related to less improvement in sleep quality. Column 2 of (Table 3) shows the results of the multivariable preselection regression models per group of clinical and cognitive variables (step 2) associated with sleep quality. To avoid collinearity interference of pain (MPI) and depression (BDI) were excluded from multivariable analyses. The variables of the multivariable preselection models with a level of significance of $P < 0.2$ were entered in the multiple backward regression analyses.

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	Simple regression models PSQI change				Multivariable preselection regression models			Multivariable regression model (final model)			
	B	b	P	R^2	B	B	P	B	b	P	R^2
Sleep quality baseline	.53	.50	**.00**	27.7%				.50	.48	.00	40.2%
Clinical factors											
Pain (NRS)	.55	.21	**.01**		.31	.12	.18				
General fatigue (MFI)	.11	.06	.44		.08	.04	.62				
Interference of pain (MPI)	.46	.11	.16								
Disability (PDI)	.08	.22	**.01**		.07	.19	**.03**	.07	.19	**.03**	
Emotional factors											
Psychological distress (HADS total score)	.12	.21	**.02**					.15	.26	**.01**	
Cognitive factors											
Catastrophizing (PCS)	.01	.03	.70		-.03	-.06	.66				
Acceptance (AAQ)	-.05	-.14	.09		-.05	-.14	.24				
General self-efficacy (DGSS)	-.12	-.18	**.03**		-.11	-.15	.14				
Pain self-efficacy (PSEQ)	-.06	-.16	.07		.01	.02	.89				
Illness beliefs (IPQ)											
Consequences	.37	.12	.16		.39	.13	.26				
Timeline	-.06	-.03	.72		-.06	-.03	.77				
Personal control	-.02	-.01	.90		-.09	-.06	.56				
Treatment control	-.11	-.05	.55		-.08	-.03	.77				
Nature/ Symptoms	.60	.17	**.04**		.60	.17	.10				
Concerns	-.20	-.09	.29		-.53	-.25	**.03**	-.55	-.26	**.01**	
Coherence	.11	.07	.41		.05	.03	.73				
Emotional representation	.14	.07	.43		-.02	-.01	.94				

Table 3: Relationship between baseline characteristics and sleep quality posttreatment.
Legend: b=unstandardized regression coefficient, β=standardized regression coefficient, p=p value, in bold P > 0.05: Column 1: Simple regression models of change in PSQI, Column 2: multivariable preselection regression models per group of related variables of change in PSQI (removal criteria p < 0.2). Column 3: Multivariable regression model of change in PSQI (final model). All analyses are adjusted for baseline sleep quality, for age and gender. List of abbreviations (in alphabetical order): AAQ=Acceptance and Action Questionnaire, DGSS=Dutch General Self Efficacy Scale, HADS=Hospital Anxiety and Depression Scale, IPQ=Illness Perception Questionnaire, MFI=Multiple Fatigue Inventory-Dutch version,

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MPI=Multidimensional Pain Inventory, NRS=Numerical Rating Scale, PCS=Pain Catastrophizing scale, PSEQ=Pain self-efficacy scale.

Column 3 of (Table 3) presents the results of the final multiple linear backward elimination regression model investigating the association between clinical, emotional and cognitive factors and sleep quality post treatment. The results revealed that baseline poorer sleep quality, a higher level of pain related disability and more psychological distress were significantly associated with less improvement in sleep quality following treatment. In addition, less concerns at baseline were related to less improvement in sleep quality. The explained variance (R^2) for the final model was 40.2%.

Discussion

The results of this study show that the improvement of sleep quality after multidisciplinary pain management treatment is limited and that the majority of CWP patients with sleep problems still experience a poor quality of sleep after a multidisciplinary pain management treatment. In addition, higher levels of psychological distress and disability were related to less improvement in quality of sleep. The measurements were conducted in a representative sample of chronic widespread pain patients of middle age, with a higher proportion of women than men, and high levels of pain, fatigue, depression, and disability [10,22,47].

The study reveals that as many as 94% of chronic widespread pain patients still experienced poor sleep quality after treatment, even though the various elements of a multidisciplinary pain management treatment, such as improving body awareness and relaxation, learning to cope with pain, establishing a daily routine, and increasing physical activity, can have a positive impact on sleep quality. This suggests that the standard approach to pain management, which does not specifically target sleep, may not be sufficient to improve sleep quality. This approach may not adequately address the complex and multifaceted nature of sleep quality. Conversely, studies in patients with CWP that did target sleep quality (e.g., with sleep education, sleep hygiene and/or cognitive behavioral therapy focusing on specific insomnia) reported a large effect size (d 0.8) in improvement of sleep quality [25,48]. As stated by McCrae, et al., [25] cognitive behavioral intervention for sleep and pain appears to be distinct interventions with distinct mechanistic effects. Therefore, a hybrid program aimed at improving both pain management and sleep quality may be worthwhile. A pilot study by Pigeon, et al., [16] showed that a hybrid program is feasible. Further research should be conducted on the effectiveness of such interventions.

Several factors, including higher levels of pain-related disability and psychological distress at baseline, predicted lack of improvement in sleep quality. These findings suggest that coping with pain-related disability and emotional distress may require greater emphasis in treatment, particularly within the context of sleep problems [49]. The finding that more concerns about pain at baseline were associated with a better

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treatment outcome on sleep quality might be an artifact.

The following methodological issues need to be considered. First, Authors did not include a control group. Therefore, it is not possible to attribute changes in outcome measures to multidisciplinary pain treatment, nor is it possible to distinguish between predictors of a natural course of a disorder and predictors of successful treatment. Controlled, longitudinal studies are needed to further evaluate the effectiveness of rehabilitation on sleep quality. Second, although the predictors were selected based on their relevance for pain rehabilitation in CWP there were still a relatively large number of predictors. Therefore, a statistical preselection was applied. This procedure may have caused some instability of the results. Third, Authors assessed self-reported sleep quality only. A more extensive assessment (i.e., polysomnography and actigraphy) may provide more detailed results. However, in chronic pain or chronic insomnia objective measurements of sleep may not always be a valid outcome measure [50,51]. Furthermore, subjective measurements of sleep quality, as reported by the patient, reflect patient experience and are therefore important outcome measures.

Conclusion

In conclusion, after a personalized multidisciplinary pain management treatment the majority of CWP patients with sleep problems still experienced poor sleep quality. To address this, it may be necessary to incorporate specific strategies (e.g., sleep education, sleep hygiene and/or cognitive behavioral therapy for sleep) to improve sleep as part of the multidisciplinary treatment plan. Addressing pain related disability and psychological distress, may also help to improve sleep quality. Further research on the management of sleeping disorders in patients with CWP is urgently needed.

References

1. Drewes AM. Pain and Sleep Disturbances with Special Reference to Fibromyalgia and Rheumatoid Arthritis. Rheumatol. 1999;38(11):1035-8. PubMed | CrossRef
2. Bigatti SM, Hernandez AM, Cronan TA, Rand KL. Sleep Disturbances in Fibromyalgia Syndrome: Relationship to Pain and Depression. Arthr Care and Res: Official J Amer Coll Rheum. 2008;59(7):961-7. PubMed | CrossRef
3. Miró E, Lupiáñez J, Hita E, Martínez MP, Sánchez AI, Buela-Casal G. Attentional Deficits in Fibromyalgia and its Relationships with Pain, Emotional Distress and Sleep Dysfunction Complaints. Psychol Health. 2011;26(6):765-80. PubMed | CrossRef
4. Moldofsky H. The Significance of the Sleeping–Waking Brain for the Understanding of Widespread Musculoskeletal Pain and Fatigue in Fibromyalgia Syndrome and Allied Syndromes. Joint Bone Spine. 2008;75(4):397-402. PubMed | CrossRef
5. Tang NK, Wright KJ, Salkovskis PM. Prevalence and Correlates of Clinical Insomnia Co-Occurring with Chronic Back Pain. J Sleep Res. 2007;16(1):85-95. PubMed | CrossRef
6. Gerhart JI, Burns JW, Post KM, Smith DA, Porter LS, Burgess HJ, et al. Relationships Between Sleep Quality and Pain-Related Factors for People with Chronic Low Back Pain: Tests of Reciprocal and Time of Day Effects. Ann Behav Med. 2017;51(3):365-75. PubMed | CrossRef

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7. Burgess HJ, Burns JW, Buvanendran A, Gupta R, Chont M, Kennedy M, et al. Associations Between Sleep Disturbance and Chronic Pain Intensity and Function: A Test of Direct and Indirect Pathways. Clin J Pain. 2019;35(7):569. PubMed | CrossRef
8. Hamilton NA, Pressman M, Lillis T, Atchley R, Karlson C, Stevens N. Evaluating Evidence for the Role of Sleep-in Fibromyalgia: A Test of the Sleep and Pain Diathesis Model. Cognit Ther Res. 2012;36:806-14. PubMed | CrossRef
9. Wagner JS, DiBonaventura MD, Chandran AB, Cappelleri JC. The Association of Sleep Difficulties with Health-Related Quality of Life Among Patients with Fibromyalgia. BMC Musculoskelet Disord. 2012;13(1):1-0. PubMed | CrossRef
10. de la Vega R, Racine M, Castarlenas E, Solé E, Roy R, Jensen MP, et al. The Role of Sleep Quality and Fatigue on the Benefits of An Interdisciplinary Treatment for Adults with Chronic Pain. Pain Pract. 2019;19(4):354-62. PubMed | CrossRef
11. Arnold LM, Crofford LJ, Mease PJ, Burgess SM, Palmer SC, Abetz L, et al. Patient Perspectives on the Impact of Fibromyalgia. Patient Educ Couns. 2008;73(1):114-20. PubMed | CrossRef
12. Casarett D, Karlawish J, Sankar P, Hirschman K, Asch DA. Designing Pain Research from the Patient's Perspective: What Trial End Points are Important to Patients with Chronic Pain? Pain med. 2001;2(4):309-16. PubMed | CrossRef
13. Scascighini L, Toma V, Dober-Spielmann S, Sprott H. Multidisciplinary Treatment for Chronic Pain: A Systematic Review of Interventions and Outcomes. Rheumatol. 2008;47(5):670-8. PubMed | CrossRef
14. Köke AJ, Hilberdink S, Hilberdink WK, Reneman MF, Schoffelen T, Heeringen-de Groot D. KNGF-Standaard Beweeginterventie Chronische Pijn. Koninklijk Nederlands Genootschap Fysiotherapie (KNGF). 2014.
15. Häuser W, Thieme K, Turk DC. Guidelines on the Management of Fibromyalgia Syndrome–A Systematic Review. Eur J Pain. 2010;14(1):5-10. PubMed | CrossRef
16. Lumley MA, Schubiner H, Lockhart NA, Kidwell KM, Harte SE, Clauw DJ, et al. Emotional Awareness and Expression Therapy, Cognitive-Behavioral Therapy, and Education for Fibromyalgia: A Cluster-Randomized Controlled Trial. Pain. 2017;158(12):2354. PubMed | CrossRef
17. Amirova A, Cropley M, Theadom A. The Effectiveness of the Mitchell Method Relaxation Technique for the Treatment of Fibromyalgia Symptoms: A Three-Arm Randomized Controlled Trial. Int J Stress Manag. 2017;24(1):86. CrossRef
18. Andrews NE, Strong J, Meredith PJ, D'Arrigo RG. Association Between Physical Activity and Sleep in Adults with Chronic Pain: A Momentary, Within-Person Perspective. Phys Ther. 2014;94(4):499-510. PubMed | CrossRef
19. Whibley D, AlKandari N, Kristensen K, Barnish M, Rzewuska M, Druce KL, et al. Sleep and Pain: A Systematic Review of Studies of Mediation. Clin J Pain. 2019;35(6):544. PubMed | CrossRef
20. Bernardy K, Füber N, Köllner V, Häuser W. Efficacy of Cognitive-Behavioral Therapies in Fibromyalgia Syndrom-A Systematic Review and Metaanalysis of Randomized Controlled Trials. J Rheumatol. 2010;37(10):1991-2005. PubMed | CrossRef
21. Chronic pain (Primary and Secondary) in Over 16s: Assessment of all Chronic Pain and Management of Chronic Primary Pain. London: National Institute for Health and Care Excellence (NICE). 2021. PubMed | CrossRef
22. Skúladóttir H, Sveinsdottir H, Holden JE, Gunnarsdóttir TJ, Halldorsdottir S, Björnsdottir A. Pain, Sleep, and Health-Related Quality of Life After Multidisciplinary Intervention for Chronic Pain. Int J Environ Res Public Health. 2021;18(19):10233. PubMed | CrossRef
23. Pigeon WR, Moynihan J, Matteson-Rusby S, Jungquist CR, Xia Y, Tu X, et al. Comparative Effectiveness of CBT Interventions for Co-Morbid Chronic Pain & Insomnia: A Pilot Study. Behav Res Ther. 2012;50(11):685-9. PubMed | CrossRef
24. Blake C, Cunningham J, Power CK, Horan S, Spencer O, Fullen BM. The Impact of a Cognitive Behavioral Pain Management Program on Sleep in Patients with Chronic Pain: Results of A Pilot Study. Pain Med. 2016;17(2):360-9. PubMed | CrossRef

Citation: Aleid de Rooij, Van der Leeden M, Roorda L D, Rinkema M, Beuving W and Dekker J. Does a Multidisciplinary Pain Management Treatment Improve Sleep Quality in Patients with Chronic Widespread Pain and Sleep Problems? Results from the AMS-Pain Cohort. J Rehab Pain Med. 2023;1(3):125-132.
DOI: https://doi.org/10.37191/Mapsci-JRPM-1(3)-014

25. McCrae CS, Williams J, Roditi D, Anderson R, Mundt JM, Miller MB, et al. Cognitive Behavioral Treatments for Insomnia and Pain in Adults with Comorbid Chronic Insomnia and Fibromyalgia: Clinical Outcomes from the SPIN Randomized Controlled Trial. Sleep. 2019;42(3):zsy234. PubMed | CrossRef
26. Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL, et al. The American College of Rheumatology 1990 Criteria for the Classification of Fibromyalgia. Arthr and Rheum: J Amer Coll Rheumatol. 1990;33(2):160-72. PubMed | CrossRef
27. Köke A, Brouwers M, Heuts P, Schiphorst Preuper R, Smeets R, Swaan L, et al. Consensus Report Pain Rehabilitation. Maastricht: Pijn Kennis Centrum Maastricht (Pain Knowledge Centre Maastricht). 2005.
28. Buysse DJ, Reynolds III CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: A New Instrument for Psychiatric Practice and Research. Psychiatry Res. 1989;28(2):193-213. PubMed | CrossRef
29. Cole JC, Dubois D, Kosinski M. Use of Patient-Reported Sleep Measures in Clinical Trials of Pain Treatment: A Literature Review and Synthesis of Current Sleep Measures and A Conceptual Model of Sleep Disturbance in Pain. Clin Ther. 2007;29(11):2580-8. PubMed | CrossRef
30. de Rooij A, van der Leeden M, Roorda LD, Rinkema M, Beuving W, et al. Factors Associated with Sleep Quality in Patients with Chronic Widespread Pain Attending Multidisciplinary Treatment. Pain Practice. 2020;20(5):471-9. PubMed | CrossRef
31. Dworkin RH, Turk DC, Wyrwich KW, Beaton D, Cleeland CS, Farrar JT, et al. Interpreting the Clinical Importance of Treatment Outcomes in Chronic Pain Clinical Trials: Imp Recommendations. J Pain. 2008;9(2):105-21. PubMed | CrossRef
32. Williamson A, Hoggart B. Pain: A Review of Three Commonly Used Pain Rating Scales. J Clin Nurs. 2005;14(7):798-804. PubMed | CrossRef
33. Smets EM, Garssen B, Bonke BD, De Haes JC. The Multidimensional Fatigue Inventory (MFI) Psychometric Qualities of An Instrument to Assess Fatigue. J Psychosom Res. 1995;39(3):315-25. PubMed | CrossRef
34. Beck AT, Steer RA, Brown GK. Bdi-ii manual.
35. Miles A, McManus C, Feinmann C, Glover L, Harrison S, Pearce S. The Factor Structure of the BDI in Facial Pain and Other Chronic Pain Patients: A Comparison of Two Models Using Confirmatory Factor Analysis. Br J Health Psychol. 2001;6(2):179-96. PubMed | CrossRef
36. Kerns RD, Turk DC, Rudy TE. The West Haven-Yale Multidimensional Pain Inventory (WHYMPI). Pain. 1985;23(4):345-56. PubMed | CrossRef
37. Soer R, Köke AJ, Vroomen PC, Stegeman P, Smeets RJ, Coppes MH, et al. Extensive Validation of the Pain Disability Index in 3 Groups of Patients with Musculoskeletal Pain. Spine. 2013;38(9):E562-8. PubMed | CrossRef
38. Bjelland I, Dahl AA, Haug TT, Neckelmann D. The Validity of the Hospital Anxiety and Depression Scale: An Updated Literature Review. J Psychosom Res. 2002;52(2):69-77. PubMed | CrossRef
39. Sullivan MJ, Bishop SR, Pivik J. The Pain Catastrophizing Scale: Development and Validation. Psychol Assess. 1995;7(4):524.
40. Bond FW, Hayes SC, Baer RA, Carpenter KM, Guenole N, Orcutt HK, et al. Preliminary Psychometric Properties of the Acceptance and Action Questionnaire–II: A revised measure of Psychological Inflexibility and Experiential Avoidance. Behav Ther. 2011;42(4):676-88. PubMed | CrossRef
41. Reneman MF, Kleen M, Trompetter HR, Preuper HR, Köke A, Van Baalen B, et al. Measuring Avoidance of Pain: Validation of the Acceptance and Action Questionnaire II-Pain Version. Int J Rehabil Res. 2014;37(2):125-9. PubMed | CrossRef
42. Schwarzer R, Jerusalem M, J. Weinman, S. Wright, & M. Johnston. Generalized Self-Efficacy Scale. Measures in Health Psychology: A User's Portfolio. Caus and contr bel. 1995;35:37. CrossRef
43. Nicholas MK. The Pain Self-Efficacy Questionnaire: Taking Pain into Account. Eur J Pain. 2007;11(2):153-63. PubMed | CrossRef
44. Broadbent E, Petrie KJ, Main J, Weinman J. The Brief Illness Perception Questionnaire. J Psychosom Res. 2006;60(6):631-7. PubMed | CrossRef

Citation: Aleid de Rooij, Van der Leeden M, Roorda L D, Rinkema M, Beuving W and Dekker J. Does a Multidisciplinary Pain Management Treatment Improve Sleep Quality in Patients with Chronic Widespread Pain and Sleep Problems? Results from the AMS-Pain Cohort. J Rehab Pain Med. 2023;1(3):125-132.
DOI: https://doi.org/10.37191/Mapsci-JRPM-1(3)-014

45. Broadbent E, Petrie KJ, Main J, Weinman J. The Brief Illness Perception Questionnaire. J Psychosom Res. 2006;60(6):631-7. PubMed | CrossRef
46. Field AP. Discovering Statistics Using SPSS:(and Sex, Drugs and Rock'n'roll). 2005. CrossRef
47. Köke AJ, Smeets RJ, Schreurs KM, Van Baalen B, De Haan P, Remerie SC, et al. Dutch Dataset Pain Rehabilitation in Daily Practice: Content, Patient Characteristics and Reference Data. Eur J Pain. 2017;21(3):434-44. PubMed | CrossRef
48. Martínez MP, Miró E, Sánchez AI, Diaz-Piedra C, Cáliz R, Vlaeyen JW, et al. Cognitive-Behavioral Therapy for Insomnia and Sleep Hygiene in Fibromyalgia: A Randomized Controlled Trial. J Behav Med. 2014;37:683-97. PubMed | CrossRef
49. Smith MT, Quartana PJ, Okonkwo RM, Nasir A. Mechanisms by Which Sleep Disturbance Contributes to Osteoarthritis Pain: A Conceptual Model. Curr Pain Headache Rep. 2009;13:447-54. PubMed | CrossRef
50. Schutte-Rodin S, Broch L, Buysse D, Dorsey C, Sateia M. Clinical Guideline for the Evaluation and Management of Chronic Insomnia in Adults. J Clin Sleep Med. 2008;4(5):487-504. PubMed | CrossRef
51. Okifuji A, Hare BD. Nightly Analyses of Subjective and Objective (Actigraphy) Measures of Sleep in Fibromyalgia Syndrome: What Accounts for the Discrepancy. Clin J Pain. 2011;27(4):289. PubMed | CrossRef

Citation: Aleid de Rooij, Van der Leeden M, Roorda L D, Rinkema M, Beuving W and Dekker J. Does a Multidisciplinary Pain Management Treatment Improve Sleep Quality in Patients with Chronic Widespread Pain and Sleep Problems? Results from the AMS-Pain Cohort. J Rehab Pain Med. 2023;1(3):125-132.
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