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The effect of relaxation therapy on autonomic functioning, symptoms and daily functioning, in patients with chronic fatigue syndrome or fibromyalgia: a systematic review

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Abstract

Objective: To establish the effects of relaxation therapy on autonomic function, pain, fatigue and daily functioning in patients with chronic fatigue syndrome or fibromyalgia.

Method: A systematic literature study was performed. Using specific keywords related to fibromyalgia or chronic fatigue syndrome and relaxation therapy, the electronic databases PubMed and Web of Science were searched. Included articles were assessed for their risk of bias and relevant information regarding relaxation was extracted. The review was conducted and reported according to the PRISMA-statement.

Results: Thirteen randomized clinical trials of sufficient quality were included, resulting in a total of 650 fibromyalgia patients (11 studies) and 88 chronic fatigue syndrome patients (3 studies). None of the studies reported effects on autonomic function. Six studies reported the effect of guided imagery on pain and daily functioning in fibromyalgia. The acute effect of a single session of guided imagery was studied in two studies and seems beneficial for pain relief. For other relaxation techniques (eg. muscle relaxation, autogenic training) no conclusive evidence was found for the effect on pain and functioning in fibromyalgia patients comparison to multimodal treatment programs. For fatigue a multimodal approach seemed better than relaxation, as shown in the sole three studies on chronic fatigue syndrome patients.

Conclusion: There is moderate evidence for the acute effect of guided imagery on pain, although the content of the visualization is a matter of debate. Other relaxation formats and the effects on functionality and autonomic function require further study.

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Chronic fatigue syndrome, fibromyalgia, relaxation, visualization, imagery, autogenic training, pain, fatigue, autonomic functioning, daily functioning

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Introduction

Fibromyalgia and chronic fatigue syndrome fall into the spectrum of what might be termed functional disorders or stress-associated (or stress intolerance)[1,2] syndromes by virtue of frequent onset after acute or chronic stressors and apparent exacerbation of symptoms during periods of physical or emotional stress.[3]

Consequently, much interest has been expressed in the possible role of the autonomic nervous system in the pathogenesis of fibromyalgia or chronic fatigue syndrome. Many of the common symptoms could be attributed to a dysfunction of the autonomic nervous system.[4] In fact, many studies strongly support the notion that autonomic dysregulation is frequent in fibromyalgia or chronic fatigue syndrome.[5–9]

This fits in the observations that both disorders appear to be preceded by (childhood) trauma, long periods of stress or a life event, suggesting that the stress may act by inducing a self-perpetuating vicious cycle.[10] It seems that the illness onset might be facilitated by a shift within the stress system from chronic hyperfunction to hypofunction, implying an inability to adequately respond to new stressors and, eventually, giving rise to long-term disturbances in stress-regulating, pain-processing and immune mechanisms.[11,12] Autonomic dysfunction may thus explain the diverse clinical manifestations of chronic fatigue syndrome or fibromyalgia.[4]

In consequence, managing stress should be a rational therapy modality in the multidisciplinary and biopsychosocial approach of these patients.[1,13] Obviously, relaxation therapy will be integrated in most rehabilitation approaches for fibromyalgia or chronic fatigue syndrome. In despite of its widespread use for the management of fibromyalgia or chronic fatigue syndrome, studies examining the effectiveness for relaxation therapy in fibromyalgia or chronic fatigue syndrome have not been reviewed systematically. This lacuna makes it difficult for clinicians to apply evidence to practice, as many different kinds of relaxation therapy are available. In addition, it is unclear whether relaxation therapy influences autonomic function in patients with fibromyalgia or chronic fatigue syndrome. Is relaxation therapy capable of restoring the homeostasis of the stress response system, and will patients cope better with daily stressors by applying relaxation techniques? Does relaxation therapy avoids further or future overload of the stress response system in patients with chronic fatigue syndrome or fibromyalgia? And finally, does relaxation therapy leads to improvements in fatigue, pain and daily functioning in patients with chronic fatigue syndrome or fibromyalgia?

This study investigates whether relaxation therapy is beneficial for patients with chronic fatigue syndrome or fibromyalgia.

Methods

This systematic review is reported following the PRISMA-guidelines (Preferred Reporting Items for Systematic reviews and Meta-Analyses).[14]

To identify relevant articles PubMed and Web Of Science were searched until May 2014. The search strategy was based on a combination of search terms related to "chronic fatigue syndrome" or "fibromyalgia" combined with terms related to "relaxation". The construct of the search strategy is presented in Supplementary Table 1.

To be included in the present systematic review, articles had to report the results of randomized controlled trials evaluating relaxation for patients with fibromyalgia or chronic fatigue syndrome on

Table 1. Evidence table.

Study	Sample	Design>	Experimental intervention (EI)	Control intervention (CI)	Outcome	Results
Guided imagery/visualization (FM)						
Fors and Götestam, 2000[21]	61♀ FM (ACR) 45,7 ± 10y *DO: 3.*	T0 1x I Tpost.	EI1: 1 x 30' audio tape guided imagery (visualization: pleasant nature images). EI2: 1 x 30' audio tape patient education (visualization: natural pain-killing system).	1 x 30' free talking about FM.	VAS pain.	EI1 & EI2:↘ ≠ CI: =.
Fors et al., 2002[20]	61♀ FM (ACR) 45,7 ± 10y *DO: 6.*	T0 4w I daily T.	EI1: Daily x 30' audio tape guided imagery (visualization: pleasant nature images). EI2: Daily x 30' audio tape patient education (visualization: natural pain-killing system).		VAS pain in daily diary.	EI1:↘ 4w slope ≠. EI2 & CI:↘ 4w slope.
Castel et al., 2007[26]	45 FM (ACR) 43,7 ± 8,6y 39 ♀ *DO: I.*	T0 1x I Tpost.	EI1: Hypnosis (10') with relaxation (20': visualization pleasant beach). EI2: Hypnosis (10') with analgesia suggestion (20': visualization blue liquid analgesic stream soothing pain).	Relaxation: 5' demo of relaxing body parts, 10' focus on diaphragmatic breathing, 5' suggestion of well-being.	VAS pain; MPQ.	Overall VAS, MPQ :↘ EI1 = CI EI2 > EI1, CI.
Menzies et al., 2006[25]	48 FM 49,6 ± 10,53y 47♀ *DO: I.*	T0 6w I - T mid 4w I - T post.	3 audio tapes with 20' guided imagery. 1. basic script: familiarity with GI. 2. pleasant scene imagery. 3. pain related (2006) or journey in immune system (2014). w1-6: each tape used at least daily for 2w. w7-10: chosen tape at least daily.	Usual care.	MPQ FIQ.	MPQ = (EI = CI) FIQ↘ (EI>CI).
Menzies et al., 2014[27]	72 ♀ FM 46,9 ± 12,8y *DO: 8.*				BPI BFI.	BPI↘ (EI > CI) BFI↘ (⇔CI↘).
Verkaik et al., 2014	70 FM (ACR) 47,4 ± 11,4y 69♀ *DO: 17.*	T 0 4w I T mid FU 6w.	2x 1,5h (4w interval) group guided imagery session (instructions and discussion guided imagery and exercises; pleasant and pain related) + CD with guided imagery exercise 2x/d during 4 w.	2x 1,5h (4w interval) group discussion 2x 1,5h (4w interval) group discussion.	Daily VAS FIQ.	FIQ, VAS = (EI =CI).

(Continued)

Table 1. (Continued)

Study	Sample	Design>	Experimental intervention (EI)	Control intervention (CI)	Outcome	Results
Ost applied relaxation (CFS)						
Deale et al., 1997[19]	60 CFS (CDC) 31,9 ± 9y 41 ♀ *DO:* 7.	T0 4-6m I T mid, post FU 1, 3, 6m.	13 sessions CBT (graded activity, pacing, sleep hygiene, cognitive strategies, etc).	Ost applied relaxation: PMR and visualisation, fast relaxation; taught during 13 treatment sessions, and practiced 2x/d.	SF-36: physical functioning. Fatigue questionnaire.	6m: SF-36↘ EI = CI Fatigue↘ > in EI + outcome (SF-36↘) EI > CI.
Deale et al., 2001[18]	60 CFS (CDC) 41,4 ± 10,4y 36 ♀ *DO:* 7.	T0 4-6m I FU 6m, 5y.				6m: + outcome (SF-36↘ & fatigue↘): EI > CI 5y: EI = CI.
Thomas et al., 2008[28]	40CFS (CDC) 28 ♀ DO: 5.	T0 10w I T post FU 6m.	10x 1h individual session. Multiconvergent therapy (CBT + GET, pacing, mindfulness, etc.) (n=17, 48 ± 8,03y).	CI1: 10x 1h Ost applied relaxation techniques) (*n*=14, 45 ± 12,56y). CI2: control (*n*=9, 46 ± 11,04y).	Karnofsky performance, Improvement in fatigue and disability.	Improved patients EI > CI1,2 (T post & FU 6m); Means =.
(Progressive) Muscle Relaxation (PMR) (FM)						
Field et al.,2002[23]	20 FM (ACR) 50,9y *DO:/.*	T0 5w I T post.	2x/w 30' massage therapy (Swedish and Shiatsu).	2x/w 30' PMR instructions.	10-point Likert pain and fatigue; Tender points and pain assessment (algometry).	Overall↘, but EI>CI.
Buckelew et al.,1998[22]	119 FM (Yunus criteria) 43,98 ± 9,6y 108♀ *DO:18.*	T0 6w I T post 2y I FU 3m, 1y, 2y.	*Phase 1: 6w individual training (1,5-3h/w + 2x/w home work) Phase 2: 2y group maintenance (1h/m)*		Tender point index (TPI). Myalgic score (algometry). VAS pain.	6w, 3m : TPI ↘ in EI > CI 3m, 2y : VAS ↘ in EI (no group ≠) 2 y: Myalgic score ↘ in EI2,3 (no group ≠).

Table 1. (Continued)

Study	Sample	Design>	Experimental intervention (EI)	Control intervention (CI)	Outcome	Results
			EI1: Biofeedback/relaxation (cognitive and muscular relaxation strategies with biofeedback for trapezius tension). EI2: Exercise group (ROM, aerobic, strength, posture) EI3: EI1+EI2.	Educational information on diagnosis, treatment and general health.		
Other relaxation						
Hammond et al., 2006[24]	183 FM (ACR) ±48,5 y ±90% ♀ *DO: 82.*	T0 10w I FU 4, 8m.	10x 2h group educational exercise therapy (education, exercise therapy, pacing, sleep hygiene, relaxation, pain-fatigue-stress management) + activity program 5x 30'/w.	10x1 h group relaxation lessons (visualisation, breathing exercises) .	FIQ (pain, physical function and total).	Overall ↘ EI > CI: total (4m); EI=CI: pain and physical function (4, 8m), total (8m).
Keel et al., 1998[29]	32 FM (ACR) ±49 y 24♀ *DO: 5.*	T0 15w I T post FU 3m.	15 x 105-120' group therapy sessions (information, self-control and acceptance, exercise therapy, relaxation, group discussions) (*n*=16n=14, incl 12 ♀; 48y).	15 x 45-60' group relaxation sessions (autogenic training) (*n*=16n=13, incl 12 ♀; 50y).	Pain diary.	EI↘, CI↘ T post: EI = CI FU: EI ≠ CI.

FM = Fibromyalgia, ACR = 1990 American College of Rheumatology criteria for FM, CFS = Chronic fatigue syndrome, CDC = 1994 Centre of Disease Control criteria for CFS, DO = drop-out. H = hour, w = week, m = month, y = year, T0 = pre-treatment assessment, T post = post-treatment assessment, FU = follow-up, I = Intervention. CBT = Cognitive Behavioural Therapy; PMR = Progressive Muscle Relaxation; GI= Guided Imagery; GET = Graded Exercise Therapy; ROM = Range of Motion; VAS = Visual Analogue Scale, MPQ = McGill Pain Questionnaire, FIQ = Fibromyalgia Impact Questionnaire, BPI = Brief Pain Inventory; BFI = Brief Fatigue Inventory; SF-36 = Short Form 36 Health Survey. & indicate a reduction or increase for a certain outcome; >, <, =, ≠, indicate whether these changes are larger, smaller, equal, different or opposite in the Intervention Group (IG) and Control Group (CG).

autonomic function, fatigue, pain and daily functioning. All randomized controlled trials studying the effect of relaxation are allowed, regardless of the control intervention.

Eligibility assessment of the search results was performed according to following eligibility criteria:

- Study subjects were adult (> 18 years) chronic fatigue syndrome or fibromyalgia patients.
- All kinds of relaxation (as stand-alone therapy) were allowed and its efficacy was studied.
- Relaxation as part of a multimodal program or combined with movement therapies (eg. Yoga, stretching, etc.) were not allowed.
- Only randomized controlled trials published in full text record in English, French, Dutch or German were included.

First, all search results were independently searched and screened by two of the researchers (MM and TV), based on title and abstract. The full text article was retrieved if the citation was considered potentially eligible and relevant. In the second phase, each full text article was once again independently evaluated by the two researchers whether it fulfilled the inclusion criteria. If any of the eligibility criteria were not fulfilled, then the article was excluded from the literature review. In case of disagreement the last researcher was consulted (FS).

Information was extracted from each included trial on: (1) characteristics of trial participants; (2) type/format of intervention; (3) type/format of control intervention; (4) outcome measure and therapy effects regarding pain, fatigue, daily functioning and autonomic function. Data were extracted from included studies by TV and MM. When extracted data did not match, the study was discussed in order to find a consensus.

Methodological quality of the different studies was assessed with the specific checklist for randomized controlled trials of the Dutch Institute for Healthcare Improvement CBO provided by the Dutch Cochrane Centre (http://dcc.cochrane.org/beoordelingsformulieren-en-andere-downloads). This checklist assesses 9 items: 1: Are patients randomized to a group; 2: Is it a blind allocation?; 3: Are patients blinded?; 4: Are therapists blinded?; 5: Are assessors blinded?; 6: Were groups comparable?; 7: Is there a sufficient portion of patients included in the follow-up of?; 8: Are all patients analysed the group to which they were randomized?; 9: Are groups treated equally? All items are score with "yes", "no" or "lack of information". Since blinding of patients was not possible, we checked whether patients were naïve to the intervention. If patients remained naïve, studies obtained one point for this item. If studies only relied on self-reports, the item regarding the blinding of the assessor was ignored. Item 7 was positively appreciated if the drop-out was less than 10% and similar in the different groups. Based on the methodological quality of the randomized controlled trials, studies could reach a level of evidence A2 (good quality, sufficient sample size and double-blinded) or B (if previous criteria not fulfilled) (www.cbo.nl).

Methodological quality was assessed independently by two researchers (TV and MM), who were blinded from each other's' quality assessment. After rating the selected articles, the results of both researchers were compared and differences were analysed. In case of disagreement, the reviewers screened the article a second time to obtain a consensus. When consensus could not be reached a third opinion was provided by the last author (FS).

After pooling the results, the overall quality of evidence for each outcome was rated with the Grades of Recommendation, Assessment, Development and Evaluation (GRADE) approach.[15] GRADING the evidence was done by the first author and final author. For every type of relaxation a GRADE summary statement is provided under the respective paragraph in boxes in italics.

Results

Figure 1 shows the process of study selection. In the second screening phase most studies were excluded based on the intervention used. After reading the full text, relaxation therapy was often not used as sole treatment component. Finally, 13 randomized controlled trials that met the inclusion criteria were included in the systematic review

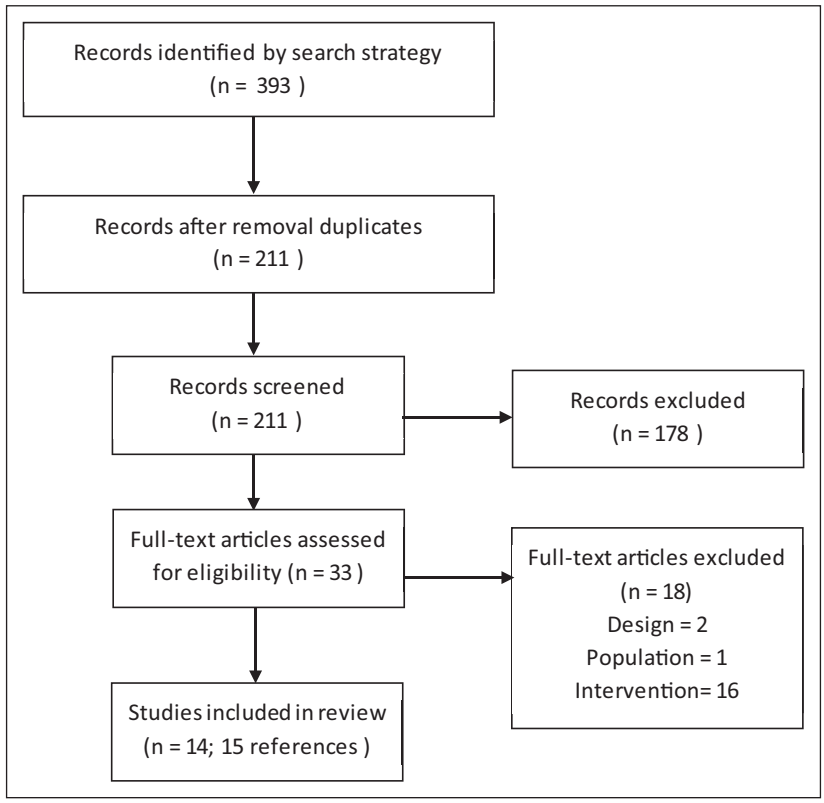

Figure 1. Flow chart study selection.

(reported in 14 articles given the fact that the study of Verkaik was reported in a Dutch paper in 2011[16] and in an English paper in 2014)[17]. The two papers by Deale et al. are counted as 2 studies, even though the 2001 study[18] was in fact the long-term follow-up report of the 1997 study.[19] Also the study by Fors et al.[20] is a 4 week extension of the study of Fors and Götestam.[21] In total the review contained 650 fibromyalgia patients and 88 chronic fatigue syndrome patients.

The risk of bias and the level of evidence of the different studies are reported in Supplementary Table 2.

In most cases (94 % or 110 of the 117 items) the two researchers agreed. After a comparison of the 7 differences, the reviewers reached a consensus for 1 item. The remaining 6 points of discussion were solved after a third opinion. The final score of each study is presented in Supplementary Table 2, with the explanation for the loss of points.

Methodological quality varied between 2/8 to 6/8. Only in 2 studies 9 items were evaluated.[22,23] The other 10 studies relied on self-reports. This means that assessor and patient are one person. Therefore blinding was only scored once (blinding of the patient). None of the studies reported the therapist to be blinded, which is obvious given the nature of the therapy.

Also blinding of the patients was impossible, in some studies patients were kept naïve for the different interventions,[21,24] These studies obtained 1 point if the format of the interventions was quite similar (item 9), in this that patients would not assume to be in a control or experimental session. All studies scored well on randomization and comparability of groups.

Because none of the studies was double-blinded, all studies obtained a GRADE level of evidence B.

For each study, the characteristics for which data were are presented in Table 1.

Regarding intervention, 6 studies evaluated the effects of guided imagery,[16,17,20,21,25-27] 3 studied (the sole studies in chronic fatigue syndrome patients) the effects of Ost applied relaxation techniques (explained later on),[18,19,28] 2 used muscle relaxation techniques,[22,23] 1 autogenic training,[29] and finally the last article studied the effect of a more undefined relaxation session.[24] The latter might be due to the fact that relaxation therapy served as control intervention, as it did in 6 other studies.[18,19,23,26,28,29]

Autogenic training refers to a series of mental exercises involving relaxation and autosuggestion, which focus the mind on the body's experience of relaxation,[30] Progressive Muscle Relaxation is a technique for learning to control the state of tension in ones muscles.[31] In Ost applied relaxation techniques, it is aimed at learning to relax rapidly as soon as signs of anxiety are recognised. The client is learned to watch for early signs of anxiety (worrying thoughts, somatic symptoms e.g. palpitations, abdominal discomfort, muscle tension) as cues to immediately start Progressive Muscle Relaxation.[32] All varying techniques share the fact that they enhance self-efficacy.

Interventions that were compared to relaxation therapy were diverse: hypnosis, massage, exercise therapy, usual care, Cognitive Behavioural Therapy, etc.

Two studies reported the effect of one session of relaxation,[21,26] while the others used a treatment program of at least four weeks.

Only three studies reported the effects in chronic fatigue syndrome patients,[18,19,28] all fulfilling the 1994 Centre of Disease Control criteria[33] for chronic fatigue syndrome. Besides Menzies et al.[25] and Buckelew et al.,[22] fibromyalgia studies (n=10) used the 1990 American College of Rheumatology criteria[34] for diagnosing fibromyalgia. The majority of the participants was female with a mean age varying between 31.9 years[19] and 50.9 years.23

Most outcome measures concerned self-report measures and questionnaires. For evaluating pain, Visual Analogue Scales and the McGill Pain Questionnaire were most often used. Regarding functionality the Fibromyalgia Impact Questionnaire was the most prevalent in the selected studies.

Most studies evaluated the effect on both pain and functionality and four additionally studied the effect on fatigue. Fatigue was measured with different tools in five studies. No studies were found assessing the effect of relaxation on autonomic parameters.

Effects of guided imagery/visualization (fibromyalgia)

All of the six studies that investigated the effects of guided imagery/visualisation in fibromyalgia patients reported effects on pain. Two studies found an acute reduction in pain after one session of guided imagery on pain.[21,26] The effect depended on the content of the visualization. In the study of Fors and Götestam,[21] the visualization of a pleasant environment led to a decrease in pain, while the visualization of the human analgesic system did not. The study by Castel,[26] found that analgesia suggestion was however more pain relieving than the pleasant visualization. After a prolonged guided imagery program, pain significantly ameliorated in those visualizing pleasant things, while worsening in those visualizing the human analgesic system or subjected to a single 30' free talking session about fibromyalgia.[20] In the studies of Verkaik[16,17] and Menzies,[25,27] pain did not change after a prolonged guided imagery program including both pleasant visualization and pain or immune related visualization.

For functionality, measured with the Fibromyalgia Impact Questionnaire, Verkaik[16,17] did not found an effect, while Menzies[25] reported a larger improvement in the relaxation group compared to the usual care group.

In the latest study of Menzies[27] the relaxation group showed an improvement in *fatigue*, while the control group reported worsened fatigue.

There is conflicting evidence for the isolated effect of guided imagery or visualization on pain and functionality in patients with fibromyalgia. The acute effect of a single guided imagery session seems beneficial for pain reduction in fibromyalgia (moderate evidence). The content is a matter of debate.

Ost applied relaxation (chronic fatigue syndrome)

In both of the studies by Deale[18,19] and in the study of Thomas,[28] the Ost applied relaxation therapy (aimed at learning to relax rapidly as soon as signs of anxiety are recognised by watching for early signs of anxiety) was used as a control intervention. Immediately after, until six months after the treatment programs, a multimodal program (consisting of Cognitive Behavioural Therapy, pacing, mindfulness, etc.) resulted in less fatigue compared to the relaxation therapy alone.[19]

Regarding functionality, results may be confusing: at six months follow-up the increases in the subscale physical functioning and the Karnofsky performance scale were equal between the multimodal groups and the relaxation group,[19.28] while the amount of patients reaching a defined improvement is higher in the multimodal groups.[19,28] At five years follow-up, no differences were found between the relaxation and Cognitive Behavioural Therapy groups.[18]

In short term (up to six months) there is preliminary evidence for a less beneficial outcome, especially regarding fatigue, in chronic fatigue syndrome patients only receiving Ost relaxation compared to more comprehensive rehabilitation programs.

Muscle relaxation (fibromyalgia)

Muscle relaxation programs resulted in decreased pain and fatigue, both on self-report measures as on algometry measures, but changes were not always significantly different compared to the control intervention.[22.23] Massage therapy however was more efficacious than Progressive Muscle Relaxation instructions in reducing self-reported pain and fatigue and pain assessments.[23] Muscle relaxation with biofeedback and/or exercise were more efficacious in reducing tender point index compared to educational information, but it seems that adding exercise may result in better outcome.[22]

There is very limited evidence for the isolated pain relieving effects of muscle relaxation in fibromyalgia, possibly other modalities (massage, exercise, biofeedback) are more beneficial or need to be added to generate a synergistic effect.

Other relaxation therapy formats (fibromyalgia)

Regarding pain, autogenic training (patients repeating a set of visualisations themselves) in group sessions was equally effective as integrated group therapy sessions (including exercise therapy, relaxation, acceptance, discussion etc.) in symptom reduction, immediately post-intervention. However, at follow-up, there was an increase in pain in the relaxation group and a decrease in the experimental group, a difference that was statistically significant.[29]

Ten sessions of group relaxation, including breathing exercises and visualisation, resulted in quite similar improvements at 4 and 8 months on the Fibromyalgia Impact Questionnaire, compared to a multimodal approach consisting of exercise therapy, activity program, pacing, stress-management, relaxation etc. Only for the total score of the Fibromyalgia Impact Questionnaire (including subscales like anxiety, depression etc.), the comprehensive approach was better at four months follow-up.[24]

Discussion

Most studies investigated the effect on pain and functioning and the results are conflicting.

This may come as no surprise given the huge variance in used protocol, formats, control therapies etc.

Nevertheless, it seems that a single session of guided imagery has beneficial acute effects on pain in patients with fibromyalgia.[21,26] For prolonged treatment programs of guided imagery more study is warranted, because the studies of Verkaik[16,17] and Menzies[25] could not confirm the findings of Fors et al.[20] that the regular use of pleasant guided imagery pain has alleviating effects during a four week period and has consequently clinical utility. The fact that results were not univocal may be due to the content of the guided imagery, which is indeed a matter of debate. Fors et al.[20] compared two types of imagery: one pleasant visualization not referring to pain or other negative aspects and one visualizing the human endogenous system. The imagery exercise of Verkaik[16,17] and Menzies[25,27] incorporated both pleasant imagery and pain or immune system related imagery. It seems thus beneficial to distract attention from the pain/body. From these findings it seems better to distract and guide the patient towards a decreased health anxiety,[21] and away from the pain.

In the study by Castel et al.[26] the hypnosis plus analgesia suggestion was however more efficacious in reducing pain, compared to relaxation or to hypnosis with relaxation suggestion. But there might be a difference between hypnosis with analgesia or relaxation suggestion. A deeper hypnosis was used in the hypnosis plus analgesia suggestion group compared to the relaxation suggestion group. Different from imagery studies using the visualization of the endogenous pain inhibitory system, the participants were asked to imagine a liquid or blue analgesic stream that filtered through their skin and reached different parts of their body (muscles, joints, bones, internal organs). It was suggested that the liquid soothed the pain in the most affected areas, eliminated the tension, and created feelings of wellbeing. [26] This means that an external source of pain inhibition was visualized.

For functionality results are more inconclusive. Some results indicate improved functionality following guided imagery,[25] others report similar improvements in the relaxation therapy group comparison to often more comprehensive treatment programs including exercise therapy and activity programs[24] and still others report ambiguous results.[19,28] The effect on this outcome measure certainly deserves further attention, but it is remarkable that none of the studies provide firm evidence for multicomponent therapy programs being more efficacious in improving functional status than relaxation alone. The restoring effect of relaxation therapy is mirrored e.g. in a reduction in the number of visits to a doctor by almost a third, suggesting that the effect of support from both the group leader and peers may have led to less health care seeking. Half of the group in the study of Hammond et al. considered relaxation therapy as beneficial for their fibromyalgia.[24] Taken together these findings suggest that the positive effects of relaxation therapy in patients with fibromyalgia are (partly) due to improvements in self-efficacy. A systematic literature review identified self-efficacy as one of the major factors responsible for a positive rehabilitation outcome in patients with chronic pain.[35]

But, as previously mentioned, the reporting of study findings is sometimes confusing and further study should account for that. In the studies of Deale[18,19] it is reported that Cognitive Behavioural Therapy was more efficacious than relaxation therapy in improving functional status in chronic fatigue syndrome patients, because substantial self-reported improvement occurred in 70% (63% with the drop-outs) of the Cognitive Behavioural Therapy patients, compared with 19% (17% with the drop-outs) of the patients in the relaxation sessions. But on the other hand there was no significant interaction effect for the change in the subscale physical functioning of the Short form 36 health survey (SF-36). This may suggest that the results of "general improvement" may be influenced by the patients' perceptions. It could be that patients' expectancies are higher regarding comprehensive treatment approaches compared to relaxation therapy alone. Global improvement was rated on a 7-point scale from "very much better" through "unchanged" to "very much worse." Consequently, the score of improvement may rather reflect therapy satisfaction than improvement, as changes on the SF-36 were not significantly better. On the other hand, improvement was sometimes defined

as a 50% change on the SF-36 or a defined cut-off (83%) on the SF-36.[19] The same goes for the study by Thomas,[28] in which the amount of patients presenting a 10% increase or a 80% score on the Karnofsky performance scores post-treatment is significant higher in the Multiconvergent therapy group, but the change in performance score was not statistically different.[28]

Fatigue was only studied in three chronic fatigue syndrome studies[18,19,28] and in the fibromyalgia studies by Field[23] and Menzies.[27] Besides the latter who found guided imagery to be better than usual care,[27] all these studies used relaxation therapy as control intervention and found a larger reduction in fatigue in the massage therapy group,[23] Cognitive Behavioural Therapy group[18,19] or the Multiconvergent therapy group.[28]

No studies directly evaluating the effect of relaxation on autonomic parameters in patients with chronic fatigue syndrome or fibromyalgia were revealed. This may be warranted, since different studies reported autonomic aberrances in these populations.[7,9,36,37]

Inconsistencies in some of the finding may be due to the variety in protocols and the different relaxation formats. Some of the methods are performed alone; some require the help of another person (often a trained professional or an audio tape); some involve movement, some focus on stillness; while other methods involve different elements.

All these techniques can be performed alone, with some techniques relying on mental exercises (eg. autogenic training), others requiring contracting and relaxing of the muscles (Ost relaxation and progressive muscle relaxation). The guided imagery, on the other hand, consists of suggestions given to a client by a trained practitioner and is thus induced with the assistance of a therapist or tape.

Based on the present review the findings of the studies using guided imagery are the most promising for treating patients with fibromyalgia. This may suggest that fibromyalgia patients need an external cue to be able to relax and to benefit from the relaxation therapy. It seems the most beneficial to visualize pleasant things and guide the brain away from the pain, unless the suggestion of administering an analgesic is given. But the content of the guided imagery demands for further research.

The present review is based on randomized controlled trials which is in favour of the level of evidence. Unfortunately, risk of bias was possible in all studies. Due to the nature of the intervention, it was hard to blind patients for the type of intervention. Only in the studies evaluating different interventions provided by audiotape, blinding or assuring naïve patients was possible. Furthermore, most of the studies relied on self-report measures, prohibiting blinding of the assessors as well. The combination of both self-report measures and the lack of blinding of patients, may be an important shortcoming.

Secondly, it is a pity that no studies were found evaluating the effect of relaxation on autonomic function in these patients. This may be due to the very stringent eligibility criteria and studying only two databases. Only studies evaluating the effect of relaxation therapy as a stand-alone therapy were included, to allow studying the isolated effect of relaxation therapy. In the excluded studies relaxation therapy was often combined with stretching or flexibility exercises,[38,39] yoga[40] etc. To avoid bias through studies incorporating more "movement oriented modalities", these studies were excluded. This was done in order to study the primary aim of the literature study. Probably, combining relaxation therapy with other treatment modalities like patient education, counselling, activity management and exercise imparts synergistic effects.

Finally, many of the included studies used relaxation therapy as a control intervention and this may have influenced the format of the relaxation, the description of the formats and the reporting of the results. It might have even introduced therapist bias into the trial (i.e. that the therapist, being aware of the study hypothesis, becomes biased towards a less favourable outcome of the control intervention). Furthermore, since relaxation is often used as control intervention in studies, it might be that we have missed some of these studies as they might have been identified by other MeSh terms, more related to their experimental intervention.

Consequently, it is clear that more research is warranted into the isolated effects of relaxation

therapy in patients with fibromyalgia and especially in chronic fatigue syndrome. Especially since studies on physiological effects are lacking and the current effects on functioning are heading for clearer comparisons with the more time and money consuming multicomponent programs. However, we do not propose relaxation therapy as a stand-alone therapy, but it should be considered which components are the most valuable in a multicomponent program, as functional outcome does not seem very different to that of relaxation on its own, based on the present knowledge. Using physiological (i.e. autonomic and HPA-axis responsiveness) outcomes is warranted to examine the mechanism of action of relaxation therapy for patients with fibromyalgia or chronic fatigue syndrome.

Six of the included studies concerned guided imagery, but studies on other popular relaxation techniques, as Progressive Muscle Relaxation and autogenic training are scarce. These are however frequently used techniques and deserve further study. It would be interesting for instance to study the autonomic response to different kinds of relaxation to monitor which formats can induce the best relaxation effect.

Clinical messages

- Although firm evidence for the isolated effects of relaxation therapy is lacking, the acute effect of a single guided imagery session seems beneficial for pain reduction in fibromyalgia. The content is a matter of debate, but probably pleasant visualization (away from the pain) is the best.
- Muscle relaxation alone seems less beneficial for pain relief in fibromyalgia than a in a combination with other modalities.
- Longer relaxation therapy programs seem beneficial for improving daily functioning, competing with more multimodal programs.

Conflict of interest

The authors declare that there is no conflict of interest.

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