

ACUTE EFFECTS OF PROGRESSIVE MUSCLE RELAXATION ON STATE ANXIETY AND SUBJECTIVE WELL-BEING IN CHRONIC BULGARIAN PATIENTS WITH SCHIZOPHRENIA

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received: 28.3.2012;

revised: 16.6.2012;

accepted: 20.8.2012

SUMMARY

Background: Recently, there has been an interest in the relative effectiveness of progressive muscle relaxation (PMR) within the multidisciplinary treatment of patients with schizophrenia. The present study is aimed at providing evidence on the efficacy of PMR as means of alleviating the state anxiety and psychological distress and a way to increase subjective well-being in chronic patients with schizophrenia.

Subjects and methods: Sixty four schizophrenia patients underwent 2 sessions of PMR. On the third session they were randomly allocated to either the PMR or the reading control condition. The State Anxiety Inventory (SAI) was used to assess state anxiety and the Subjective Exercise Experience Scale (SEES) to assess psychological distress and subjective well-being before and after the third session for both groups.

Results: Our data show a significant time by group interaction for the SAI and SEES (Wilks $\lambda=0.58$, $p<0.001$). Effect sizes for PMR were -0.22 (95%CI= -0.73 to 0.19) for state anxiety, -0.96 (95%CI= -0.41 to -1.43) for psychological stress, and $+1.01$ (95%CI= 0.45 to 1.54) for subjective well-being.

Conclusion: The present study provides scientific evidence for the utility of PMR in the chronic psychiatric settings for patients with schizophrenia.

Key words: schizophrenia - progressive muscle relaxation - rehabilitation

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INTRODUCTION

Schizophrenia is one of the most debilitating psychiatric disorders (Rossler et al. 2005). It accounts for 1.1% of the total disability-adjusted life years (DALYs) and 2.8% for men and 2.6% for women of years lived with disability. Schizophrenia is listed as the fifth leading cause of loss of DALYs worldwide in the age group 15-44 years (WHO 2008). Once the diagnosis is made, antipsychotic drugs which block dopamine D2 receptors are the main treatment of schizophrenia (Tandor et al. 2009). First-generation antipsychotics (e.g., chlorpromazine and haloperidol) are effective in the treatment of psychotic symptoms, but often lead to motor side-effects. In the past 15 years, so-called second-generation agents (e.g., amisulpride, aripiprazole, olanzapine, quetiapine, risperidone) that less frequently cause motor side-effects have been introduced for treatment. Although second-generation antipsychotics are equally effective in treating positive symptoms, the promise of greater efficacy against negative and cognitive symptoms has not been borne out (Tandor et al. 2009). Many patients continue to suffer from persistent symptoms and relapses, particularly when they fail to adhere to prescribed medications. This

underlines the need for multi-modal care including psychosocial therapies as adjuncts to antipsychotic medications to help alleviate symptoms and to improve adherence, and functional outcome (van Os & Kapur 2009). Research on psychosocial approaches to treatment of schizophrenia has yielded incremental evidence of efficacy of cognitive behavioural therapy, social skills training, family psycho-education, assertive community treatment and supported employment (Kern et al. 2009). Additional research is needed to examine active ingredients of the therapeutic modalities that work, to identify the synergistic effects of combinations of interventions. Recently, there has been an interest in the relative effectiveness of progressive muscle relaxation (PMR) within the multidisciplinary treatment of patients with schizophrenia (Probst et al. 2007). Increased sensitivity to stress and anxiety is related to worsening of symptoms. People with schizophrenia experience difficulties in coping with stress and possess a relatively limited repertoire of stress coping strategies (Vancampfort et al. 2012). In schizophrenia, an increase in subjective stress results in an increase in negative affect and a decrease in positive well-being (Myin-Germeys et al. 2001). In previous studies, progressive muscle relaxation (PMR) techniques have been shown

to alleviate symptoms of anxiety and improve well-being in patients with panic disorder and generalized anxiety disorder (Conrad & Roth 2007). Studies of PMR as an intervention in treating trait anxiety in people with schizophrenia have been performed already in the beginning of the 1980s. Hawkins et al. (1980) demonstrated that after 10 sessions of 40 minutes PMR (five times a week) participants demonstrated reduced trait anxiety compared with a minimal treatment control (Hawkins et al. 1980). Chen et al. (2009) showed that the degree of trait anxiety improvement is significantly higher in a PMR group receiving 40 minutes of PMR for 11 consecutive days than in a placebo control group. When measuring a patient's level of anxiety, one must consider both trait anxiety and state anxiety. Trait anxiety is independent of specific situations and measures a person's general level of anxiety that persists on a regular basis. State anxiety is dependent on very specific situations and changes on a regular basis (Landers 1999). A previous study in patients with schizophrenia in an acute inpatient setting (Vancampfort et al. 2011) concluded that PMR is highly effective in reducing acute feelings of stress and anxiety. A reduction in perceived stress and state anxiety in these acutely ill patients was associated with an increase in subjective well-being (Vancampfort et al. 2011). The present study aims to confirm the effects of a single session of PMR on state anxiety, stress and subjective well-being in a sample group of Bulgarian patients with schizophrenia in a chronic setting. The single-session format was utilised to facilitate evaluation of acute changes in state anxiety, stress and subjective well-being following the intervention.

SUBJECTS AND METHODS

Participants

Over a 6-month period, consecutive patients with a DSM-IV (WHO 2008) diagnosis of schizophrenia of the chronic department of the State Psychiatric Hospital in Tzerova Korja, Bulgaria were invited to participate. Acute symptoms were remitted in all patients. Participants with the following characteristics were excluded from the study: (a) having a psychiatric co-morbidity (anxiety disorders and/or depressive disorders, substance dependence), (b) exhibiting musculoskeletal problems that might affect PMR training, (c) not being able to concentrate for 25 minutes duration at a time, (d) not being able to complete the questionnaires within 5 to 10 minutes without difficulties and with minimal instructions, (e) having received previous PMR training.

Procedure

The effects of 25 minutes of PMR were compared with a resting control condition. During two weeks participants undertook one weekly habituation session in order to get used to the environment and the protocol.

Feedback was elicited during these sessions to allow participants to experience and share the changes and sensations of relaxation. In the third week participants were randomly allocated to either the experimental PMR or the resting control condition. An independent statistician generated a randomization list using a research randomizer (<http://www.randomizer.org>). Questionnaires were answered 5 minutes before and immediately after the completion of the condition. During the week of the test condition also psychiatric symptoms were administered. Informed consent was obtained from all participants, under procedures approved by the Local Ethics Committee and in accordance with the Helsinki Declaration.

Progressive muscle relaxation

PMR was originally developed by Edmund Jacobson (Jacobson 1939). The original Jacobson method required dozens of sessions where the participant was taught to relax 30 different muscle groups. Bernstein & Borkovec (1973) later shortened this technique to 16 muscle groups and found it to be equally effective (Bernstein & Carlson 1993). The protocol for the PMR intervention in this study was administered by a trained physiotherapist. Training consisted of successive tensing and relaxing at least five major muscle groups, beginning with the upper body and proceeding to the lower parts. Tensing for about 8 seconds and relaxing for about 30 seconds of each muscle group was practiced twice prior to proceeding to a subsequent muscle group. The PMR is part of a larger clinical physiotherapy programme consisting of aquatic sessions (once a week), walking (twice a week), yoga training (once a week), fitness training (twice a week), psycho-education about an active lifestyle (once every two weeks) and group related movement sessions with psychosocial and cognitive objectives (twice a week). The PMR was offered once a week and lasted approximately 25 minutes.

Control condition

Participants in the resting control condition sat quietly in a room for 25 minutes and were told that they could read. Reading material was provided for participants who did not bring their own material. After the resting control condition and after completing the questionnaires, participants still had the opportunity to take part in another PMR session.

State anxiety inventory

State anxiety was assessed by the State anxiety inventory (SAI) of Spielberger (Spielberger 1983). The range of possible total scores is 20-80. Higher scores indicate higher levels of anxiety. The SAI has been extensively validated and is the most widely used measure of anxiety in exercise research.

Subjective exercise experiences scale

Stress and subjective well-being were measured using the Subjective exercise experiences scale (SEES) (McAuley & Courneya 1994). Each subscale contains four items, which are scored on a scale from 0 (not at all) to 7 (entirely). Higher scores on a subscale indicate a higher perception for this factor. The SEES represents one of the most reliable and valid instruments for assessing subjective well-being in exercise settings (McAuley & Courneya 1994).

Statistical analysis

A 2 x 2 (condition x time) MANOVA with post-hoc Scheffé was conducted using Statistica 9 to test the significance of the within pre-post and between-groups post scores differences. Effect size (ES) for a given variable was calculated as the difference after treatment between the treatment and control condition divided by

the pooled standard deviation. The established criteria of the ES, which reflects the effect of a treatment are small (0.20-0.49), medium (0.50-0.79) and large (>0.80) (Cohen 1988). Relationships between changes in measurement variables were assessed using Pearson product moment correlations. The significance level was set at 0.05 (two-tailed).

RESULTS

Participants

Out of 78 patients with schizophrenia, 64 met the inclusion criteria. Reasons for exclusion are presented in Figure 1. From the 32 patients who were allocated to the PMR, 31 (97 %) completed the session and filled out the questionnaires correctly. In the control group, 30 patients (94 %) filled out the questionnaires. More details on drop-out data are given in Figure 1.

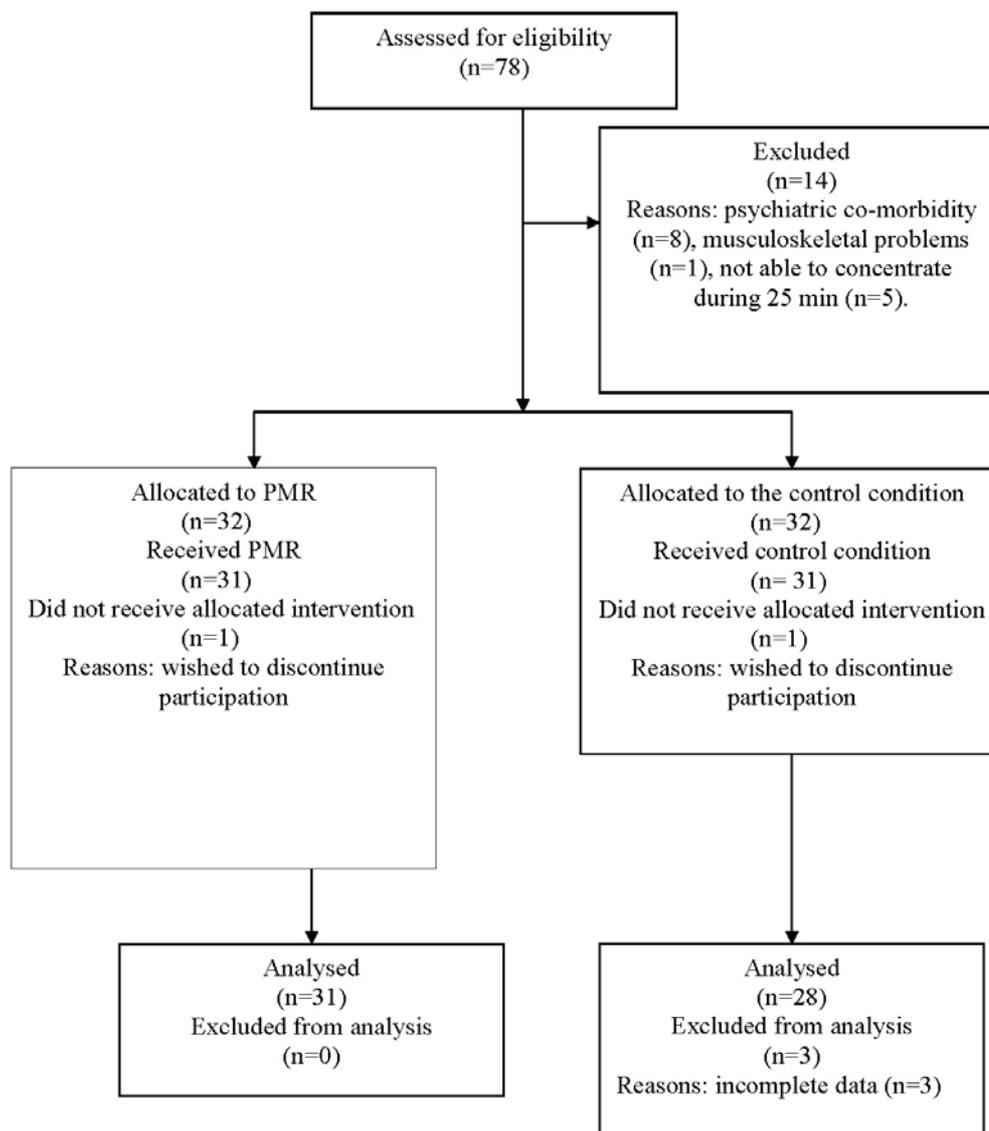


Figure 1. Flowchart of the eligible patients

Table 1. Baseline characteristics of the participants who received progressive muscle relaxation or a control condition

	Progressive muscle relaxation (PMR; n=31)	Control condition (CC; n=28)	p
Gender			0.20
Male (%)	15 (48.39 %)	13 (46.43%)	
Female (%)	16 (51.61 %)	15 (53.57%)	
Age	43.03 ± 8.76	41.07 ± 9.00	0.40

Values expressed as mean ± standard deviation or as otherwise indicated

Table 2. State anxiety, stress, well-being and fatigue scores before and after progressive muscle relaxation and control condition

	Progressive muscle relaxation (PMR; n=31)		Control condition (CC; n=28)
	Pre	Post	Pre
State anxiety (SAI)	51.77±6.0	47.74±4.71a,b	47.92±7.36
Stress (SEES)	10.52±5.30	7.77±3.77a,b	11.90±3.88
Well-being (SEES)	14.26±4.80	19.90±5.19a,b	14.71±4.13

Values expressed as mean ± standard deviation; SAI= State anxiety inventory; SEES= Subjective exercise experiences scale; MANOVA with repeated measures; Sheffé test (p set at 0.05); a= pre versus post PMR; b= post PMR versus post CC

The descriptive characteristics of the patients who completed the intervention study are shown in Table 1. Participants in the PMR and control condition were similar at baseline related to age and gender.

Internal consistency of the questionnaires

The internal consistency assessed by Cronbach's alpha coefficients in the present study was 0.71 for the SAI, and 0.74 and 0.70 for respectively the subscales psychological stress, and positive well-being on the SEES. All Cronbach's alpha values were equal to or exceeded the commonly used criterion of 0.70, which indicates that the questionnaires were sufficiently comprehensible to our chronic patients with schizophrenia.

Treatment effects

The results for all outcomes are presented in Table 2. MANOVA showed a significant time by group interaction for the SAI and SEES (Wilks $\lambda=0.58$, $p<0.001$). Scheffé post hoc analysis revealed that within the PMR group significant decreased state anxiety, psychological stress, and increased subjective well-being could be observed. There were no significant pre-post changes within the control group. Both groups differed significantly from each other for all the post-measures.

Effect sizes for PMR were -0.22 (95%CI= -0.73 to 0.19) for state anxiety, -0.96 (95%CI= -0.41 to -1.43) for psychological stress, and +1.01 (95%CI= 0.45 to 1.54) for subjective well-being.

DISCUSSION

Main findings

Our present study with a randomised controlled group design clearly demonstrates that after two

habituation session, a single bout of PMR reduces state anxiety and psychological stress and improves subjective well-being in Bulgarian patients with schizophrenia. Our findings replicate in a chronic setting previous findings (Vancampfort et al. 2011) in a Belgian sample of inpatients with schizophrenia in an acute setting.

Our findings do provide further rigorous scientific evidence for the utility of PMR within the multidisciplinary care in patients with schizophrenia. The ability to deal with state anxiety, psychological stress and negative affect during PMR may of relevance for several other mental health benefits. The use of alcohol, nicotine, or illegal drugs is a common practice among individuals with schizophrenia (Mueser et al. 2007). Although numerous motivations exist to use these substances, it has been suggested that the mentioned unhealthy behaviours may partly be attempts to alleviate or to cope with unpleasant affective states and feelings of state anxiety (Gregg et al. 2009, Winterer et al. 2010). The limited benefit of such efforts supports the need to provide other more healthy methods to regulate the variability of subjective well-being. This study demonstrates that relaxation techniques may offer such an easy to learn healthy alternative for subjective stress and state anxiety regulation.

Limitations

The present results should be viewed in the light of several methodological limitations. First of all, we used the SEES before and after a non-aerobic intervention while the questionnaire has been developed originally for investigating the negative and positive psychological responses of aerobic exercises. Nevertheless, the original authors did hypothesize that the questionnaire also can be used in a non-aerobic context (McAuley & Courneya 1994), however, data should be interpreted

with caution since more research is needed. Our Cronbach's alpha data do confirm previous research that the SEES indeed can be used consistently in non-aerobic contexts in patients with severe mental illness (Vancampfort et al. 2011). A second limitation was that we did not investigate the antipsychotic medication use, the presence of psychiatric symptoms, illness duration, socio-economic and education status in order to increase the external validity of our sample. Secondly, our study did not examine potential physiological and/or psychological mechanisms that are responsible for the reduced state anxiety, psychological distress and improved subjective well-being. A third limitation was the lack of repeated measures post-PMR. Despite state anxiety reductions last for two to four hours after cessation of the exercise (Pawlow & Jones 2005), only the response immediately after the completion of the session was assessed. Lastly, it is not known whether the PMR may have exerted its effects merely as a diversion or as welcomed evidence to patients that their psychosocial needs were being acknowledged.

Recommendations and implications for future research

Future research needs to examine potential physiological (e.g., increased norepinephrine, serotonin and beta-endorphins, increased parasympathetic activity) (Pawlow & Jones 2005) and/or psychological mechanisms (e.g., increased self-efficacy, distraction) (Conrad & Roth 2007) that could be responsible for the reduced state anxiety and psychological stress and improved subjective well-being. It also needs to be demonstrated if the beneficial effects of PMR can be translated into behavioural outcomes, for example through increasing rates of abstinence from alcohol, nicotine or illegal drugs. Specifically, future studies should examine whether implementing self-managed relaxation techniques in chronic patients with schizophrenia increases rates of abstinence from substance abuse and whether any effects of PMR on abstinence rates are mediated by reductions in psychological stress and state anxiety and increases in subjective well-being during or following these activities.

Recommendations and implications for clinical practice

As our study confirms previous results, we might state that PMR should be offered as routine care to patients with schizophrenia experiencing state anxiety and psychological stress. Our data demonstrate that PMR is also a highly relevant method of self-management in chronic patients. It may give the patients some increased sense of self-control and autonomy during their stay in hospital.

CONCLUSION

The present study further confirms that PMR is an efficient method of treatment in a broad variety of contexts. In addition, having in mind benefits such as no side effects that may appear in medical treatment, increased feeling of subjective well-being and reduced anxiety that are achieved with the method in combination with its low cost, PMR appears to be one of the most useful approaches in the work with patients whose psychotic symptoms have been remitted. Considering the low funds of many psychiatric institutions, especially in Eastern Europe, PMR would prove a very useful solution in this treatment environment.

Acknowledgements

The researchers would like to thank all our colleagues from the Tzerova Koria State Psychiatric Hospital for their voluntary cooperation, the useful pieces of advice and openness to the application of new methods of treatment in the hospital environment.

Conflict of interest: None to declare.

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