Effectiveness of dance in patients with fibromyalgia: a randomised, single-blind, controlled study

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ABSTRACT

Objective. *The aim of the present study was to assess the effectiveness of belly dance as a treatment option for patients with fibromyalgia.*

Methods. *Eighty female patients with fibromyalgia between 18 to 65 years were randomly allocated to a dance group (n=40) and control group (n=40). Patients in the dance group underwent 16 weeks of belly dance twice a week, while the patients in the control group remained on a waiting list. The patients were evaluated with regard to pain (VAS), function (6MWT), quality of life (FIQ and SF-36), depression (Beck Inventory), anxiety (STAI) and self-image (BDDE). Evaluations were carried out at baseline, 16 weeks and 32 weeks by a blinded assessor.*

Results. *The dance group achieved significant improvements in VAS for pain ($p<0.001$), six-minute walk test ($p<0.001$), FIQ ($p=0.003$), BDDE ($p<0.009$) as well as the pain ($p<0.001$), emotional aspects ($p<0.003$) and mental health ($p<0.021$) subscales on the SF-36.*

Conclusion. *Belly dance can be used in the treatment of fibromyalgia to reduce pain and improve functional capacity, quality of life and self-image.*

Introduction

Fibromyalgia is a chronic non-inflammatory syndrome characterised by diffuse body pain and the presence of tender points, sleep disorders, muscle stiffness, fatigue, dysautonomy, depression or other psychological conditions. Fibromyalgia affects approximately 2 to 5% of the general population (1-5). Individuals with fibromyalgia feel incapable of performing the majority of activities of daily living and experience a loss in quality of life comparable to that found in other chronic diseases (6-8). According to White (1999), patients with fibromyalgia achieve low scores on the Fibromyalgia Impact Questionnaire (FIQ) and six-minute walk test and experience a pronounced reduction in quality of life (9). Drug therapies for patients with fibromyalgia have a relatively low degree of effectiveness, with just 25 to 45% improvement and a 60% worsening after four years (10). Thus, there has been an increase in the number of trials with non-pharmacological treatments and co-interventions.

Different types of physical activity shows significant results in the treatment of fibromyalgia. Aerobic exercise seems to have a positive effect on quality of life (11-14). Compared with stretching, aerobic exercise has a greater influence over improvements in mental state, pain, depression, anxiety, physical function and quality of life (13, 15-17). A recent pilot study published shows that 'Body movement and perception' method based on low impact exercises, awareness of body perception and relaxation can improve pain, well being, can reduce the number of tender points and muscle contractures, and is therefore useful in FMS management (18). Dance is a type of physical activity that may have a positive effect on alleviating symptoms related to fibromyalgia.

Belly dance was first registered in cave drawings of the upper Paleolithic era. In 4000 BC, figures appeared in Naqada, Egypt, which are clear evidence of Middle Eastern dancing in sun worship and fertility rituals. In 1300 AC, with the invasion of Egypt by Arabs, belly dance gained its current festive nature, partially losing its sacred, ritualistic aspect and assuming a joyful, spontaneous connotation (19). Belly dance is a strictly female dance employing a mixture of slow, sinuous movements and distinct rapid movements. Through the rhythmic activities of dance, practitioners are able to mold their muscles through contraction and relaxation by varying the intensity, velocity and duration of the movements (20). This enables bodily control in a segmented

fashion, individualising the work of the hip, trunk and limbs (21). Belly dance was chosen in the present study as a dynamic, spontaneous therapeutic option for women with fibromyalgia.

In 2006, Bojner carried out a study involving dance therapy for patients with fibromyalgia, using a drawing of a human figure to assess body image and relating the results to verbal scales (22). In 2003, Bojner assessed hormone concentrations following dance therapy (23). Both studies found significant improvements in the dance group regarding sleep pattern, anxiety, muscle stiffness and fatigue. However, neither study assessed quality of life, pain or functional capacity.

The aim of the present study was to assess the effectiveness of belly dance as a treatment option for patients with fibromyalgia.

Methods

Patients

Eighty patients were selected from the Rheumatology outpatient clinic. The following were the inclusion criteria: diagnosis of fibromyalgia based on the criteria of the American College of Rheumatology (1); female gender; age between 18 and 65 years; not having altered treatment in previous four weeks; and having signed a informed consent document. Patients with other rheumatic diseases, painful joint diseases, uncontrolled cardiopulmonary diseases, diseases of the lower limbs or uncontrolled diabetes were excluded. The study received approval from the local ethics committee 1044/06 and ClinicalTrials.gov NCT00961805.

The randomisation sequence was generated using a computer programme that distributed the patients into dance group (intervention) and control group. Opaque, sealed envelopes were used to keep the allocation confidential.

Evaluations

All patients were evaluated at the baseline (T0) and after 16 weeks (T16) and 32 weeks (T32) following the initial evaluation. The three evaluations were performed by a blinded physiotherapist duly training in administering the tests. The following outcomes were measured:

- *Pain assessment* – a visual analogue scale (VAS) for pain was used in the form of a horizontal scale from 0 to 10 cm, with 0 representing "no pain" and 10 "unbearable pain";
- *Functional capacity* – the six-minute walk test was used and the meters traveled on a 20-meter course over a six-minute period was recorded (24);
- *Quality of life* – Fibromyalgia Impact Questionnaire (FIQ), a specific tool for fibromyalgia patients, with 10 items for the measurement of physical function and severity of symptoms, score range from 0 to 10 with higher scores indicating greater impact of fibromyalgia on quality of life (25); the Quality of life Short Form 36 (SF-36), which is generic tool was also used, scores range from 0 to 100, with higher scores denoting better quality of life (26);
- *Depression* – Beck Inventory, with 21 items measuring depression; score range from 0 to 63, with higher scores indicating a greater degree of depression (27);
- *Anxiety* – State-Trait Anxiety Inventory (STAI), with statements scored from 1 to 4, higher scores indicating a greater degree of anxiety (28);
- *Self-image* – Body Dysmorphic Disorder Examination (BDDE), a questionnaire with 32 items addressing the concern and negative assessment of physical appearance, excessive importance on the self-assessment of appearance and changes in behaviour related to appearance, score range from 1to 168 with higher scores indicating greater body image disturbance (29).

Intervention

The participants in the dance group took one-hour belly dance classes twice a week for 16 weeks. Each class had a maximum of eight students. The classes were administered by a physiotherapist with eight years of experience. Classes began with a warm-up exercise, followed by the predetermined movements for the day, choreography and a cool-down exercise. The participants received a compact disc with music and an exercise book with the history and movements proposed for the programme (Fig. 1). Beginning in the fourth week, a set sequence of movements in the form of choreography was established for training at home. The control group underwent evaluations at the predetermined times and were offered the same treatment as that of the intervention group at the end of the experiment.

Statistical analysis

Sample size was calculated using the VAS for pain as the main parameter, establishing an α error of 5%, a β error of 20% and 30 patients in each group were necessary to detect a standard deviation (σ) of 2. Ten additional patients were added to each group to compensate for possible losses. The chi-square test student's *t*-test and Mann-Whitney test were used to determine the homogeneity of the sample. Analysis of variance of repeated measurements (ANOVA) was used to determine differences in behaviour between groups over time. Spearman's correlation coefficient was used in the analysis of class attendance and the other variables. Pearson correlation were used to correlate age and BMI with pain scores (VAS).

The data from all patients were analysed, using the intention to treat approach. In cases in which the treatment was interrupted, the patients were asked to come in and undergo the evaluations and if the patient did not show up the method of adjusting for missing data was the "last observation carried forward" technique.

The level of significance was set at $p<0.05$ for all statistical tests and the SPSS 15.0 programme was used for the statistical analysis.

Results

Forty patients were included in each group. Five patients failed to complete the study: two in the dance group and three in the control group. Among these patients, only three were unable to come to the re-evaluations and their data from the previous evaluation were repeated. Figure 2 displays a flowchart of the study.

Data analysis of the baseline evaluation demonstrated that both groups were homogeneous for the majority of variables

- **Upper limbs** (snake movement and circular movements of the wrist);
- **Scapular girdle** (protrusion, elevation and retraction of the shoulder);
- **Trunk** (elevation, reset, lateral displacement, rounded movement);
- **Hips** (span, lateral movement, rounded movement, pelvic Camel, Shimmy, infinite, eight maya downward and upward, basic Egyptian);
- **Displacement** (Forward and backward with shimmy, lateral with shimmy and dabke)
- **Veil** (Eight, angel wings, tray and cabana)

Note: The movement were taught in a progressive fashion, respecting the sequence of evolution from the simplest to the most elaborate).

Fig. 1. Movements in dance group (Malika, 1998).

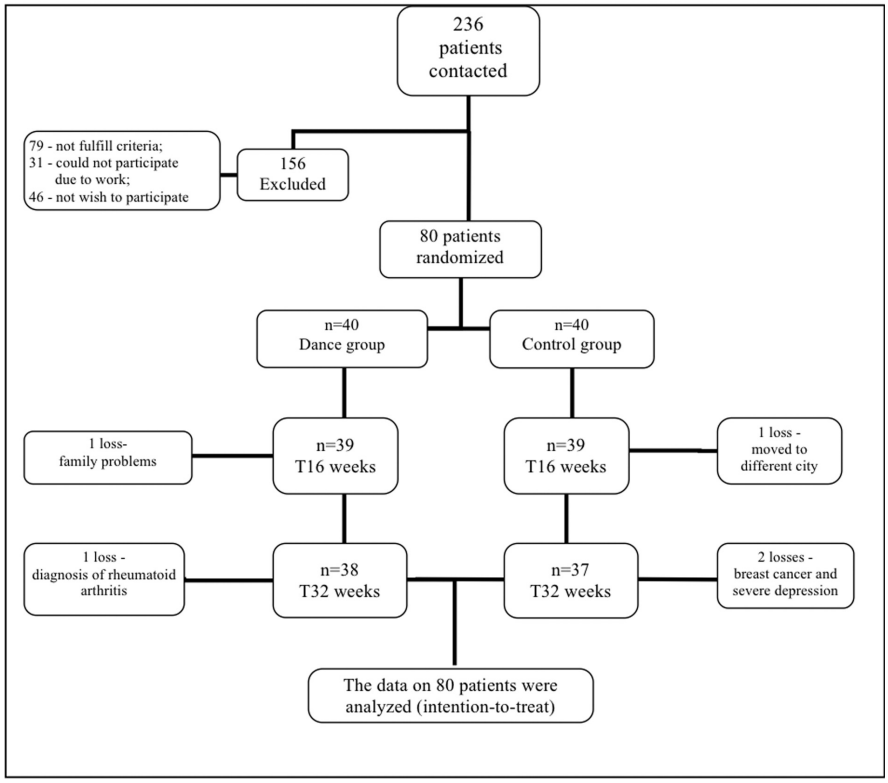

Fig. 2. Flowchart of the study.

studied, with the exception of the six-minute walk test and some subscales of SF-36 – functional capacity, physical aspects and vitality (Table I).

Statistically significant differences between groups over time were found regarding VAS scores ($p<0.001$), distance traveled on the six-minute walk test ($p<0.001$) and FIQ score ($p=0.003$), with the dance group achieving better scores, while the control group remained stable. The intra-group evaluation revealed statistically significant differences in the dance group (T0/T16 = $p<0.001$ and T0/T32= $p<0.001$) (Table II).

Regarding the SF-36, there were statistically significant differences between groups over time on the following subscales: pain ($p<0.001$), emotional aspects ($p=0.003$) and mental health ($p=0.021$), for which the dance group achieved better results than the control group. The intra-group analysis in the dance group: revealed differences between T0/T16 ($p<0.001$) and T0/T32 ($p<0.001$), for the pain; subscale between T0/T16 ($p=0.001$) and T0/T32 ($p=0.005$), for the emotional aspects (Table II).

The Beck Inventory, STAI trait and STAI state of anxiety score revealed no statistically significant differences between groups over time ($p=0.354$, $p=0.160$ and $p=0.060$, respectively) (Table II).

Regarding the BDDE questionnaire (self-image), there was a statistically significant difference between groups over time ($p=0.009$), with the dance group achieving a lower score over time while the control group maintained stable. In the intra-group analysis, there were statistically significant differences in the dance group between T0/T16 ($p<0.005$) as well as between T0/T32 ($p<0.041$) (Table II).

ANOVA for repeated measurements was applied to the sleep category (Item 16 on the Beck Inventory), and revealed a statistically significant difference in the dance group at T16 ($p=0.0499$), which was maintained at T32. Likewise, there was a statistically significant difference between groups in the quality of sleep item on the FIQ ($p=0.006$) and statistically significant intra-group differences in the dance group between T0/T16 ($p=0.001$) as well as between T0/T32 ($p<0.001$).

The average attendance record was 26.4 classes of a total of 32. A correlation was found between attendance and VAS pain (-0.397; $p=0.011$), with patients with better attendance achieving lower VAS scores at T16 when compared to T0.

After the final evaluation (T32), the participants in the dance group were asked whether they wished to continue performing belly dance or begin another physical activity after the end of the intervention (T16). Twenty-four patients (60%) either continued dancing or began another physical activity and 16 (40%) patients did not perform any physical activity. Better results were obtained at T32 regarding VAS for pain ($p<0.035$) and the SF-36 pain (subscale $p<0.022$) among those who continued to perform a physical activity in comparison to those who stopped the activity. The student's *t*-test was used for this analysis.

We found a small negative correlation between age and pain at T16 for both control (r =-0.395 / $p=0.012$) and dance group (r =-0.342 / $p=0.031$) and at T32 for dance group (r =-0.349 / $p=0,027$). No correlation was found between BMI and pain.

Table I. Characteristics of the sample at baseline.

	Dance Group Mean	Control Group Mean	*p*-value
Age (years)	49.5	49.1	p=0.859
VAS for pain (cm)	7.7	7.5	p=0.356
Six-minute walk test (m)	372.8	332	p=0.015†
FIQ	5.89	6.34	p=0.144
SF-36			
Functional capacity	44.9	32.6	p<0.001†
Limitation due to physical aspects	24.7	8.8	p<0.001†
Pain	29.6	25.7	p=0.234
General health	46	38	p=0.091
Vitality	41.3	29	p<0.001†
Social aspects	25.6	47.6	p=0.082
Emotional aspects	34.2	21.2	p=0.076
Mental health	46	43.4	p=0.599
Beck inventory	23.9	21.2	p=0.354
STAI part 1	50.5	52.8	p=0.975
STAI part 2	51.1	53	p=0.060
BDDE	42.8	48.8	p=0.400

VAS: visual analogue scale; FIQ: fibromyalgia impact questionnaire; SF-36: short form 36- item questionnaire; STAI: state-trait anxiety inventory; BDDE: body dysmorphic disorder examination questionnaire; †significant *p*-values between groups (ANOVA).

Discussion

This is the first blinded, randomised, controlled study to assess belly dance as physical activity and complementary treatment intervention for women with fibromyalgia. The aim was to offer an additional therapeutic option for reducing pain and improving quality of life. A number of authors support the notion that rhythmic exercise activates ergoreceptors and the signal are transmitted to the periaqueductal grey matter and raphe nuclei, which is the region of the brain involving the pain-inhibiting descending fibres (30). This may be the reason why the dance group obtained a 40% reduction in pain and this improvement was sustained for 32 weeks.

Pain is the most important symptom in fibromyalgia and therapy should therefore be focused on this aspect. A pain scale (VAS) and the pain subscale on the SF-36 were used in the present study to assess pain. Both measures revealed statistically significant, clinically relevant improvement in the dance group. Previous studies on conditioning in women with fibromyalgia describe a similar improvement in pain (13, 16, 31).

Regarding the negative correlation found between age and pain, it shows to us that older patients improve pain more than younger patients, however we did not find in the literature similar findings.

The FIQ is an instrument that measures diverse aspects of fibromyalgia and its impact on affected individuals. In the present study, there was a statistically significant reduction in the FIQ score in the dance group and this result was sustained through to the end of the 32-week study. Other therapeutic trials have detected changes over time in the treatment group *versus* the control group (3, 16, 32-34). Gowans (1999) found an improvement in the total FIQ score after a 12-week follow up in a study employing a playful rhythmic exercise (33).

Seventy-six percent of patients with fibromyalgia complain of fatigue and light activities apparently worsen pain and fatigue (35). The patients in the dance group initially reported an increase in pain and fatigue in the first four weeks, which decreased over time. Throughout the study the patients

Table II. Comparisons between dance group and control group at baseline, 16 weeks and 32 weeks.

	T0		T16		T32		
	Dance Group	Control Group	Dance Group	Control Group	Dance Group	Control Group	*p*-value
VAS (cm)	7.7 (1.7)	7.5 (1.3)	4.6 (2.0)	7.5 (1.4)	4.7 (2.6)	7.3 (1.7)	p<0.001†
Six-minute walk test (m)	372.8 (80.2)	332 (66.7)	443.5 (78.3)	344.3 (72.7)	431 (88.7)	343 (77.9)	p<0.001†
FIQ	5.89 (1.39)	6.34 (1.29)	4.69 (1.73)	6.61 (1.53)	4.26 (1.81)	5.9 (1.86)	p<0.003†
SF-36							
Functional capacity	44.9 (1.89)	32.6 (18.9)	52.9 (21.1)	33.1 (18.6)	56.3 (19.9)	39.1 (22.0)	p=0.146
Physical aspects	24.7 (32.2)	8.8 (17.9)	40.5 (30.6)	10.4 (21.6)	36.5 (32.4)	13.8 (26.5)	p=0131
Pain	29.6 (17.5)	25.7 (13.4)	44.7 (20.7)	25.1 (14.2)	46 (19.2)	29.1 (21.1)	p<0.001†
General health	46 (21.7)	38 (16.5)	45 (21.3)	38.1 (18.3)	44.9 (15.6)	41.5 (21.4)	p=0.580
Vitality	41.3 (18.8)	29 (18.2)	50 (22.8)	30.7 (18.1)	47.6 (23.8)	37.1 (21.8)	p=0.082
Social aspects	52.6 (27.7)	47.6 (23.1)	64.1 (28.0)	47.6 (24.5)	57.2 (27.0)	51.3 (25.5)	p=0.055
Emotional aspects	34.2 (36.90)	21.2 (33.1)	55 (33.6)	17.5 (26.1)	51.9 (39.6)	31.5 (38.7)	p=0.003†
Mental health	46 (19.9)	43.4 (24.0)	54.2 (20.7)	44.5 (26.6)	52.3 (20.8)	46.2 (22.6)	p=0.021†
Beck Inventory	23.9 (14.7)	21.2 (13.0)	20.2 (13.2)	23.5 (11.5)	23.1 (15.3)	23.5 (13.7)	p=0.136
STAI part 1	50.5 (7.68)	52.8 (8.1)	49.2 (10.2)	51.9 (8.2)	49.4 (10.0)	51.8 (9.4)	p=0.975
STAI part 2	51.1 (7.8)	53 (9.7)	50.1 (10.0)	54.8 (10.5)	49.8 (9.1)	54.1 (10.1)	p=0.205
BDDE	42.8 (32.6)	48.8 (34.2)	33.6 (25.9)	50.5 (29.4)	41.1 (24.4)	46.9 (31.8)	p=0.009†

Data presented in mean (SD); VAS: visual analogue scale; FIQ: fibromyalgia impact questionnaire; SF-36: short form 36-item questionnaire; STAI: state-trait anxiety inventory; BDDE: body dysmorphic disorder examination questionnaire; † significant *p*-values between groups.

reported the sensation of a decrease in tension and, at the end of the study, activities of daily living were performed with greater ease. This was confirmed by the results of the six-minute walk test, which was used to assess physical capacity (35). The FIQ also proved sensitive, revealing an improvement in functional capacity in daily tasks.

There was a significant improvement in the distance walked during the six-minute walk test in the dance group through at the end of the study. This is similar to findings described in other studies employing this test (34, 36, 37). However, when comparing the values of the functional capacity subscale on the SF-36, no statistically significant difference was found. It is possible that the patients had not incorporated a perception of improvement, as measured by the SF-36, which is a subjective questionnaire. Even with the difference between groups on six minute walk test at baseline, there was a significant improvement in the dance group.

Mental symptoms, limitations, difficulty in concentrating, mood swings, depression and sleep problems do not directly affect aerobic capacity, but some patients have problems in recognising these manifestations in themselves, which complicates the relationship between the perception of quality of life and reality. This situation could limit the aerobic functional capacity of individuals in relation to other factors, such as force of will or role in the family (38). Unlike the results of the present study, King found no correlation between the FIQ and the six-minute walk test (24). Most studies that employ an exercise-based treatment with the use of both these tests have found statistically significant improvements in aerobic capacity and quality of life (11).

The SF-36 assesses the impact of illness on physical, mental and social subscale. In the present study, the dance group achieved improvements in the SF-36 subscale, with the exception of functional capacity, limitation due to physical aspects, general health state, vitality and social aspects. These results differ from those obtained with the FIQ and six-minute walk test. Thus, the dynamic process of initiating a change in behaviour should be explored in light of the subjective perception of the concrete effects achieved (39).

A number of authors have assessed the impact of exercise on mood and emotional aspects in individuals with fibromyalgia, but few study have demonstrated any improvement (15, 40). In the present study, there was a significant improvement in the pain, emotional aspects and mental health subscales on the SF-36 and these results were sustained for 32 weeks. However, in the assessment with specific questionnaires addressing depression (Beck Inventory) and anxiety (STAI), no significant improvements were found. Other studies using exercise as a therapeutic modality describe similar findings (31-34, 41). Perhaps a longer time practicing the activity would have had a positive effect on depression and anxiety, or perhaps an education group should be associated to the intervention in order to encourage changes in habit, behaviour and coping with the disease. A specific medical treatment for depression could help in improving the overall state of patients, as most of the patients in the present study exhibited a moderate to severe degree of depression.

Patient education has been recognised as an essential element in the treatment of fibromyalgia, leading to improvements in pain, sleep pattern, self-efficiency and quality of life (32). Cognitive behavioural therapy (CBT) improves self-efficacy and quality of life (32). However, CBT has only proven to be better than a medical consultation regarding the Beck Inventory, mental health (SF-36) and acetaminophen intake (42). A combined treatment for the body and mind (exercise and CBT) could have synergic effects, as patients bring their behaviour style (negative or positive) with them to the doctor's office (43). The literature states that patients with chronic pain have greater psychological anguish and are less likely to adhere to treatment (39).

The concept of self-image may be formulated as a psychological phenomenon of the representation of an individual's body in his/her mind and can therefore be translated as the image one has of oneself (44). The Body Dysmorphic Disorder Examination (BDDE) is a specific quality of life assessment measure that addresses a single domain (body image) and has been validated for our language (32). In the present study, the patients with fibromyalgia achieved low scores on the self-image questionnaire, meaning that the change in their appearance was not a major cause of concern for them. Nonetheless, significantly better values were achieved following the dance intervention. Belly dance enabled the patients to pay more attention to their appearance, leading to improvements in self-image and self-esteem (29, 45).

Previous studies employing exercise in the treatment of fibromyalgia report drop-out rates ranging from 9 to 37% (12, 14, 31, 33, 46, 47). In the present study, there was a loss of only 7.5%, with no differences between groups. The most significant fact, however, is that drop out in the dance group occurred during the first month of activity. A similar finding is described other studies (13, 37), in which the patients reported an increase in pain and fatigue in the early phase of the intervention.

Due to the benefits achieved, 60% of the patients either continued dancing or sought another physical activity. Therefore, efforts should be made to find strategies for both initiating the practice of exercise as well as improving adherence to the programme. The perception of benefits during the intervention allows patients to maintain the change in behaviour (42). Adherence during a study depends on the modality of the aerobic exercise, which is a determinant factor for the post-treatment maintenance of the activity. Thus, maintenance is the key to the continuity of the benefit (33). Inability is an important factor in poor maintenance. Medication has good adherence only in the short term when compared to other therapies (39). The patients in the present study exhibited good adherence to the belly dance activity, even after the intervention had ended.

Consensus is needed regarding the importance of exercise in the treatment of fibromyalgia. Patient education regarding how to initiate and continue exercise is crucial to the success of treat-

ment (33). In the present study, there was no fundamental concern with making art, but using dance to contribute toward the maximal use of the patients, potentialities, with the aim of offering physical and psychological treatment in the promotion of their maximal capacity. We therefore conclude that belly dance leads to improvements in pain, sleep pattern, functional capacity and self-image in patients with fibromyalgia. The improvement in quality of life and patient adherence the activity make, belly dance a safe, effective therapeutic strategy for women with fibromyalgia.

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