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BRIEF REPORT

Effect of Argentine tango sessions on total physical activity time in patients with chronic inflammatory rheumatism: randomized, controlled, pilot study

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Abstract

Objective The aim of this study was to evaluate the effect of an Argentine Tango (AT) program on total physical activity (PA) time in patients with rheumatoid arthritis (RA) and spondyloarthritis (SpA).

Methods Prospective randomized controlled pilot study with two parallel groups. Participants were randomized 1:1 to attend a 24-week AT program from baseline to month 6 for the immediate tango group (ITG) and a 12-week AT program from month 3 to month 6 for the wait-list control group (WLCG). Total PA time was measured at baseline, month 3, and month 6 using the Global Physical Activity Questionnaire-ONAPS and an accelerometer.

Results Twenty-seven participants (15 RA and 12 SpA) were enrolled in the study. Thirteen participants in the WLCG and 14 in the ITG. At month 3, there was no significant difference in the total PA time between the two groups. Longitudinal analyses revealed no significant difference between the two groups regarding PA, sedentary, fatigue, anxiety, depression, balance, physical performance, pain, and stress. However, body appreciation improved significantly in the ITG compared with the WLCG. Both groups showed improved physical abilities at 6 month, including improvements in the 6-min walk test and timed up and go test. The ITG also reported reduced pain at months 3 and 6, while the WLCG exhibited improved balance at month 6.

Conclusion Although the AT program did not significantly increase total PA time in patients with CIR, it positively impacted body appreciation and physical abilities suggesting its potential as a complementary therapy.

Key Points

- *Body appreciation significantly improved after a 24-week AT program, emphasizing the positive impact of dance on self-perception.*
- *Both groups exhibited improved physical abilities at month 6, indicating a positive influence on participants' overall mobility and functional capacity.*
- *The 24-week AT group reported reduced pain at months 3 and 6, and the 12-week AT group exhibited improved balance at month 6.*

Keywords Argentine tango · Body appreciation · Physical activity · Rheumatoid arthritis · Spondyloarthritis

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Introduction

Chronic inflammatory rheumatism (CIR), including rheumatoid arthritis (RA) and spondyloarthritis (SpA), are chronic disabling diseases that affect 0.61% of the adult population in France [1]. Physical activity (PA) improves health outcomes in people with CIR [2]. Nevertheless, although regular PA is recommended, the majority of CIR patients are physically inactive [3, 4].

Studies have shown that dance-based aerobic exercise is not deleterious in patients with RA but instead exerts beneficial effects in terms of physical capacity, fatigue, anxiety, and

depression [5, 6]. No studies have been conducted in SpA. The effects of partaking in Argentine tango (AT) sessions have not yet been studied in these patients, but this has been reported to be effective in patients with Parkinson's disease (PD), resulting in improvements in balance and walking [7, 8], quality of life, psychological well-being, and feelings of bodily self-efficacy [9]. AT has also been reported to be associated with increased PA in Parkinson's patients [10]. AT dancing engages multiple physical, cognitive, psychological, and social skills, and this PA can be experienced as a pleasurable activity, without the objective of improving physical performance [11, 12]. We hypothesized that the pleasure of partaking in AT for patients with CIR would increase the total PA in these patients. Another hypothesis is that continuation of this AT activity would enhance its effects on patients over time.

The main objective of this study was to investigate the effect of a 12-week program of AT on the total PA in patients with CIR.

Methods

Study design and participants

We conducted a single-centre, prospective, two-arm, randomized, controlled pilot trial, following the CONSORT 2010 statement. This study complied with the Declaration of Helsinki, was approved by the Institutional Review Board of the Centre OUEST I (ref: 018T2-14HPS), and was registered on ClinicalTrials.gov (NCT03840785). Participants were recruited by their rheumatologist (hospital or private practice). We recruited participants with confirmed RA (ACR/EULAR classification criteria) [13], in remission (CDAI ≤ 2.8) or with low disease activity (CDAI ≤ 10); or confirmed SpA (ASAS criteria) [14] with SpA activity deemed stable by the treating rheumatologist. All participants were fully informed at inclusion and provided written informed consent. Eligible participants without tango experience were enrolled between February 2019 and November 2019, and follow-up was performed in the rheumatology department.

Randomisation and procedures

At inclusion, the participants were randomly allocated (random permuted blocks, stratified by disease) to the immediate tango group (ITG) or the wait-list control group (WLCG), with the latter including individuals who would begin the intervention after the first three months of the study. In the ITG, the participants were required to attend two AT sessions per week over 6 months. In the WLCG, the participants did not attend any sessions from baseline to month 3; thus serving as an untreated control arm. They were then required to attend two AT sessions per week between month 3 and month 6. They were not given specific advice about their PA nor sedentary behaviours during the study.

Intervention description

The weekly 1-h AT sessions took place in the rheumatology department and were always provided by the same qualified adapted physical activity teacher. The dance partners were either the participants' spouses or relatives, participants in the group, or the AT teacher. The teacher danced with all of the participants to provide individual posture correction. All of the participants changed roles (leader/guide) and partners. Each session began with an individual 20-min warm-up, which was focused on body awareness, balance control, deep muscle strengthening, flexibility, and coordination. The course continued with specific learning of this dance. The session ended with 5–10 min of focused stretching of the body areas that were engaged the most. Sessions were intentionally slow, so the PA intensity was light. They were adapted to each participant's physical limitations, e.g., with avoidance of directional changes by foot rotation, or the option to learn in a sitting position. Patients were advised to wear the most comfortable footwear.

Primary outcome

The total PA times, moderate and vigorous PA, and sedentary time were reported by the participant at baseline, month 3, and month 6 in both groups in the National Observatory for Physical Activity and Sedentariness Physical Activity Questionnaire (ONAPS-PAQ) and were objectively measured using an accelerometer [15].

The ONAPS-PAQ is a self-administered questionnaire that covers the four domains of PA: work, home, active travel, and leisure activities (frequency, duration, and intensity).

A UKK-RM42 accelerometer (UKK Terveyspalvelut Oy, Tampere, Finland) was used to record the PA intensity, frequency, and duration. The participants were asked to wear the device for 24 h over seven consecutive days. The UKK-RM42 is a triaxial accelerometer that was attached to an elastic belt on the right side of the hip at the level of the iliac crest during waking hours (excluding water activities).

The data were expressed for total PA (sum of the time spent in moderate-intensity and high-intensity PA) both in MET.min/week (moderate intensity = 4 METs, high-intensity = 6 METs) and min/week. The sedentary time was reported in min/day. The use of accelerometers also allowed measurement of the time spent in low-intensity activities (expressed in MET.min/week and min/week), not measurable by the questionnaire.

Secondary outcomes

At each visit, all of the participants completed self-administered questionnaires on fatigue with the Functional Assessment of Chronic Illness Therapy questionnaire [16]; anxiety and depression with the Hospital Anxiety and Depression scale [17], body appreciation with the Body Appreciation Scale 2 (BAS2) questionnaire [18]. The research nurse evaluated balance with the unipodal balance test; physical performance with the 6-min walk test [19] and the timed up and go test [20]. Pain and stress were assessed with a visual analogue scale.

Statistical analysis

The sample size was determined according to (i) the CONSORT 2010 statement, extension to randomized pilot and feasibility trials, and (ii) Cohen's recommendations, which define effect size (ES) bounds as small (ES: 0.2), medium (ES: 0.5), and large (ES: 0.8). With 15 participants per group, an ES of approximately 1 could be obtained for a two-sided type I error at 5% and a power of 80%. Accordingly, it has been proposed to include 30 RA participants and 30 SpA participants.

Continuous data are expressed as mean ± standard deviation or median [25th; 75th percentiles]. All the analyses were performed according to the intention-to-treat principle after the last observation carried forward imputation method for missing data. The primary analysis was also performed without imputation of missing data.

As suggested by Vickers (2001), the primary analysis (comparison of the total PA at month 3 between the two randomized groups) was carried out by a linear regression considering an adjustment for the baseline value and the pathology, after a logarithmic transformation of the dependent variable. A sensitivity analysis was carried out excluding the participants of the ITG who had partaken in fewer than 11 tango sessions (= median number of sessions) between baseline and month 3.

Longitudinal analyses of the primary and secondary outcomes were carried out by linear mixed models considering the time (baseline, month 3, and month 6), the randomization group, the "time × group" interaction, and the pathology as fixed effects, and the participant as a random effect. If necessary, a logarithmic transformation of the dependent variable was performed to achieve normality. The p-values of the "time × group" interactions are denoted p^i.

The statistical analysis was performed using the Stata software (version 15; StataCorp, College Station, Texas, USA). All tests were two-sided, with an alpha level set at 5%. No correction for multiple testing was applied in the analysis of the secondary outcomes or in subgroup analysis [21]. The findings obtained from these analyses were interpreted as exploratory.

Results

Twenty-seven participants (15 with RA and 12 with SpA) were included in the study: 13 in the WLCG and 14 in the ITG (Fig. 1). The mean age was 59 ± 12 years, the median disease duration was 10 [3, 19] years, and 85% were women. The majority of the participants had background treatment (63% conventional and 59% biological). The baseline characteristics of the participants were similar between the two groups, but more women and a shorter disease duration were observed in the WLCG (statistically not significant). Cumulative damage assessed at baseline by the HAQ for patients with RA and BASMI/HAQ-AS for patients with SpA was balance between the groups (Table 1). In the ITG group, the median number of sessions was 11 [8, 19] between month 0 and month 3 and 27 [8, 29] between month 0 and month 6. In the WLCG group, the median number of sessions was 6 [2, 14] between month 3 and month 6.

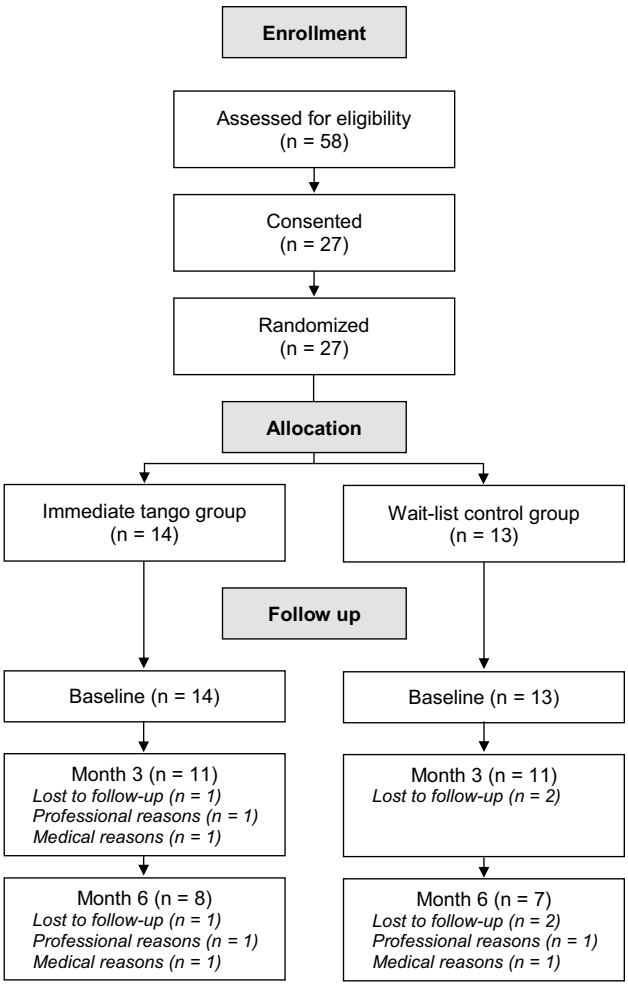

Fig. 1 Flowchart of the study

Table 1 Baseline characteristics of the participants

	All ($n=27$)	WLCG ($n=13$)	ITG ($n=14$)
Age (years)	59.4 ± 11.6	59.7 ± 11.1	59.2 ± 12.4
Female sex	23 (85.2)	12 (92.3)	11 (78.6)
Higher education level	12 (44.4)	6 (46.2)	6 (42.9)
Worker	13 (48.1)	6 (46.2)	7 (50.0)
Pathology			
Rheumatoid arthritis	15 (55.6)	7 (53.8)	8 (57.1)
Spondyloarthritis	12 (44.4)	6 (46.2)	6 (42.9)
Disease duration (years)	10.0 [3.1; 19.0]	7.2 [3.1; 14.3]	12.8 [3.4; 22.0]
HAQ*	0.9 [0.5; 1.1]	0.9 [0.5; 1.5]	0.8 [0.4; 1.1]
HAQ-AS†	1.0 [0.5; 1.5]	1.1 [0.7; 1.8]	0.8 [0.4; 1.1]
BASMI†	3.6 [3.2; 4.3]	3.6 [3.2; 3.8]	3.6 [3.2; 4.8]
Treatments			
NSAIDs	5 (18.5)	1 (7.7)	4 (28.6)
Corticosteroids	3 (11.1)	1 (7.7)	2 (14.3)
csDMARD	17 (63.0)	6 (46.2)	11 (78.6)
bDMARD	16 (59.3)	7 (53.8)	9 (64.3)
tsDMARD	1 (3.7)	0 (0.0)	1 (7.1)
Fibromyalgia (ACR 2016)	5/25 (20.0)	3/12 (25.0)	2/13 (15.4)

The data are presented as the number of participants (percentages), mean±standard deviation, or median [25th; 75th percentiles].*Only for patients with rheumatoid arthritis. †Only for patients with spondyloarthritis. *ACR*, American College of Rheumatology; *AS*, ankylosing spondylitis; *BASMI*, bath ankylosing spondylitis metrology index; *bDMARD*, biologic disease-modifying antirheumatic drug; *csDMARD*, conventional synthetic disease-modifying antirheumatic drug; *HAQ*, health assessment questionnaire; *ITG*, immediate tango group; *NSAIDs*, nonsteroidal anti-inflammatory drugs; *tsDMARD*, targeted synthetic disease-modifying antirheumatic drug; *WLCG*, wait-list control group

At month 3, there was no significant difference in the total PA between the two groups, considering an adjustment for the baseline value and the pathology: 3420 [1440; 6000] MET.min/week in the WLCG vs. 4520 [2800; 7920] in the ITG (ES: 0.03, 95%CI: − 0.53 to 0.59, $p=0.91$) (Figs. 2A and 2B). Without imputation of missing data ($n=22$ participants), the result for the complete case at month 3 was the same ($p=0.91$). This non-significant difference between the groups persisted after adjustment for (i) the sex ($p=0.89$), and (ii) the disease duration ($p=0.63$), in addition to the baseline value and the pathology. When we only considered the participants of the ITG who had attended at least 11 AT sessions between baseline and month 3, there was no significant difference in the total PA at month 3 between the two groups ($p=0.68$).

The baseline characteristics of the participants were not associated with the variation in the total PA between baseline and month 3 (data not shown).

Longitudinal analyses showed no significant difference between the two groups regarding PA regardless of the measurement method (ONAPS-PAQ or accelerometers) (Figs. 2C and 2D) or on secondary endpoints: sedentary time, fatigue, anxiety, depression, balance, physical performance, pain, and stress. However, body appreciation improved significantly between baseline and month 3 in the ITG compared to the WLCG and between baseline and month 6. (Supplementary Table 1).

Besides, there was an improvement in physical abilities at month 6 in both groups regarding the 6-min walk test, and the timed up and go test. A reduction of pain was observed at month 3 and month 6 in the ITG, and an improvement in balance at month 6 in the WLGC (Supplementary Table 1).

Discussion

In our study, partaking in AT dance sessions did not increase the PA time in CIR patients. No studies have been performed to date on the effect of dance in SpA. In RA, two studies have been performed on the benefit of rhythmic and aerobic dance, but neither study investigated the impact on the PA time [5, 6]. The study by Moffet et al. reported a significant improvement in motor skills after eight weeks of rhythmic dance [6] and the study by Noreau et al. reported an improvement in depression, anxiety, and fatigue [5]. On the other hand, our results revealed significant improvement in body appreciation (BAS2). Body appreciation is related to a positive body image and refers to favourable views of one's body such as body acceptance and respect, while rejecting unrealistic appearance ideals. The use of the

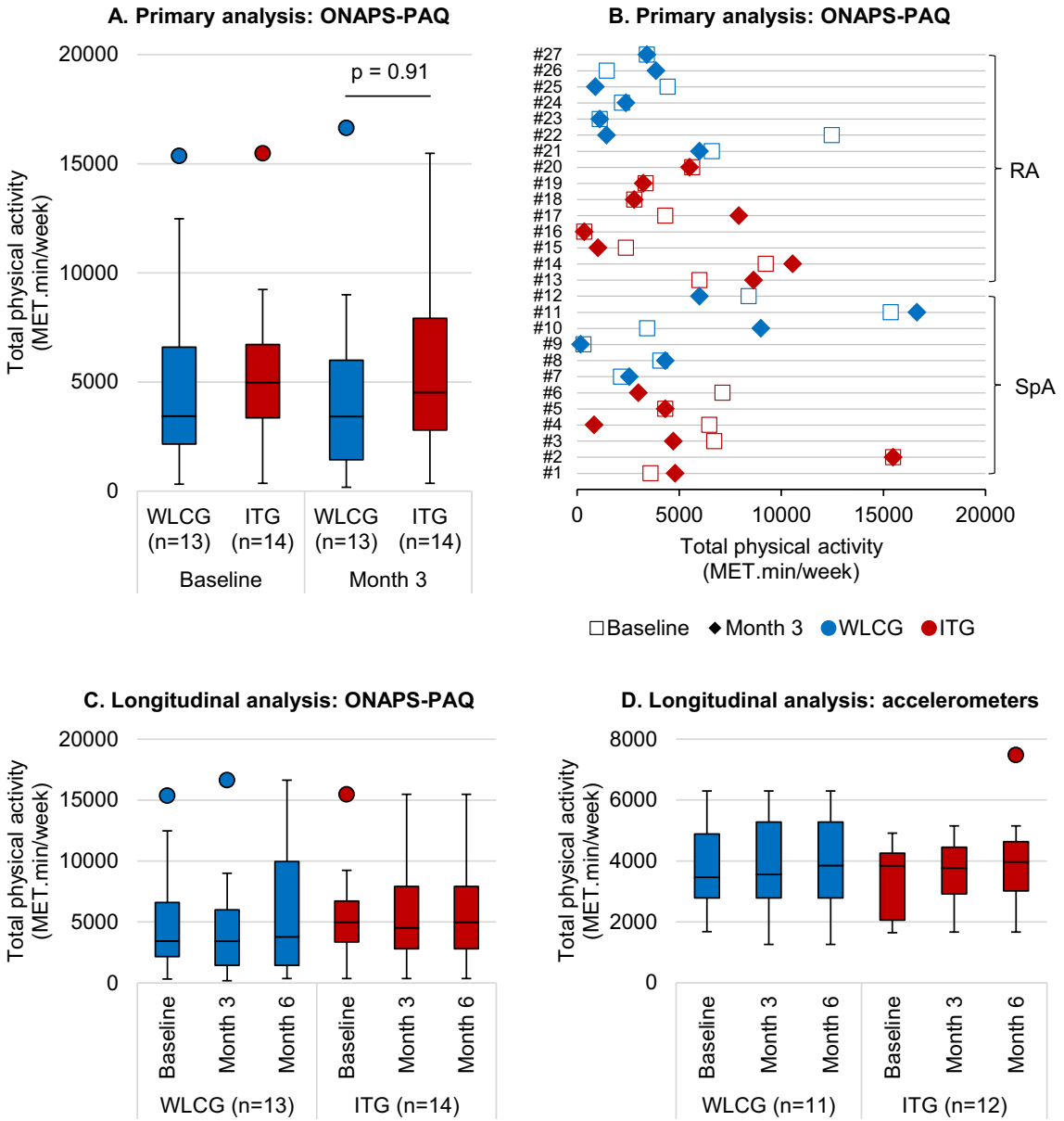

Fig. 2 Total physical activity at baseline and month 3 (**A**, **B**) for the two groups, and longitudinal analyses (**C**, **D**). In panels **A**, **C**, and **D**, the data are presented as boxplots: the central line is the median, the top and bottom of the box are the 25th and 75th percentiles, the upper adjacent value is the furthest observation that is within one-and-a-half interquartile range of the upper end of the box, the lower adjacent value is the furthest observation that is within one and a half interquartile range of the lower end of the box, and the dots represent outliers. In panel **B**, each row represents a participant, numbered from 1 to 27. In panel **A**, comparison between groups was carried out at month 3 (primary analysis) by a linear regression considering an adjustment for the baseline value and the pathology (rheumatoid arthritis or spondyloarthritis), after a logarithmic transformation of the dependent variable. In panels **C** and **D**, the analyses were carried out by linear mixed models. The "time × group" interaction is not statistically significant, and there is no statistically significant difference over time within each group (WLCG and ITG). All the analyses (panels **A**, **C**, and **D**) were performed after the last observation carried forward imputation method for missing data. ITG, immediate tango group; MET, metabolic equivalent of task; ONAPS-PAQ, national observatory for physical activity and sedentariness physical activity questionnaire; RA, rheumatoid arthritis; SpA, spondyloarthritis; WLCG, wait-list control group

BAS2 questionnaire has also demonstrated links between body appreciation and self-esteem, optimism, and positive feelings [18]. Patients with CIR experience body image disturbances due to deformities and disability [22, 23]. The participants in our study had a more positive view of their bodies, particularly in terms of aesthetics, a positive attitude towards one's body, and acceptance of physical particularities. These results have been confirmed by a qualitative study

carried out on a subgroup of these participants [24]. The positive results on body appreciation in our study, both quantitative and qualitative, are in line with the data observed in PD [9, 25]. Contrary to what we observed, in PD, AT resulted in a significant increase in participation in activities of daily living [10].

The negative results of our study could be explained by the short duration of our intervention. Although our sample size appeared to be sufficient and relevant for a pilot study, the small number of participants may have contributed to the results observed. The main difficulties in recruiting participants were geographical distance, lack of availability of participants with professional activity, and lack of interest in this practice (mainly among men). Finally, it should be noted that the main strength of our study is the fact that it is the first pilot study on the impact of AT in patients with CIR. Therefore, the findings of our study should be further investigated in a larger study, specifically to confirm effects on the level of PA, combining AT with repeated recommendations to increase PA and decrease sedentary behaviours in daily life.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s10067-024-07009-z.

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Data availability Data will be shared upon reasonable requests to the corresponding author.

Declarations

Disclosures None.

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