Revista da Sociedade Brasileira de Medicina Tropical
Journal of the Brazilian Society of Tropical Medicine
Vol.:52:e20180270: 2019
doi: 10.1590/0037-8682-0270-2018

Major Article

Pain and Quality of Life in Human T-cell Lymphotropic Virus Type 1-Associated Myelopathy or Tropical Spastic Paraparesis After Home-Based Exercise Protocol: A Randomized Clinical Trial

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Abstract

Introduction: Human T-cell lymphotropic virus type 1-associated myelopathy or tropical spastic paraparesis (HAM/TSP) causes, among other abnormalities, chronic pain that may impair quality of life (QOL). Home protocols can help those who have difficulty attending rehabilitation centers. This study aimed to evaluate the impact of a home-based exercise protocol on pain and QOL in people with HAM/TSP. **Methods:** A randomized clinical trial of people with HAM/TSP (World Health Organization criteria) classified as probable or definite. The supervised group (SG) underwent training for 12 weeks and continued the protocol at home for another 12 weeks; the unsupervised group (UG) performed the same protocol at home without physical therapist supervision for 24 weeks; and the control group (CG) maintained the usual care. QOL was assessed by the Short Form-36 health survey and the pain condition by the Brief Pain Inventory (BPI). The Chi-square, analysis of variance, Kruskal-Wallis, and Friedman tests (5% alpha) were used for the analyses. The intention-to-treat method was adopted in case of follow-up losses. Record number RBR-849jyv/ UTN: U1111-1176-2858. **Results:** Of 56 participants, 49 completed the protocol. Mean pain was moderately reduced (>30%) in the UG and CG and mildly reduced (20%) in the SG. Loss in the vitality score of QOL in the CG was noted. **Conclusions:** The protocol generated mild and moderate pain relief and reduced losses in the functional QOL in the treatment groups.

Keywords: HTLV-1. Home exercises. Quality of life. Chronic pain. Randomized clinical trial.

INTRODUCTION

The human T-cell lymphotropic virus type 1 (HTLV-1) is associated with a myelopathy known as HTLV-1–associated myelopathy or tropical spastic paraparesis (HAM/TSP)[1]. HAM/TSP is characterized as a slow and progressive demyelinating disease that presents as lower-limb weakness and spasticity, sphincteric disturbances, gait disorders, and chronic pain[2-4].

Pain is present in about 60–88% of people with HAM/TSP[5-10]. The pain intensity is presented as moderate or intense and related to the evolution of the clinical condition[7,9-11]. The presence of pain is also associated with reduced QOL[6,10,12]. Major impairments in the functional capacity and physical appearance domains of the Short Form-36 health survey (SF-36) generic quality-of-life questionnaire have been observed in people with HAM/TSP[13]. Therapeutic exercises, on the other hand, have positively impacted pain relief and increased QOL scores in this population[11,14,15].

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Received 24 July 2018
Accepted 21 March 2019

Since this patient population is socioeconomically disadvantaged and experiences intense locomotor difficulties, there is a high loss of follow-up in programs involving outpatient exercises, which impairs the results of such interventions. Home protocols can help the performance of therapeutic exercises in those who have difficulty attending rehabilitation centers. Health education programs involving home therapeutic exercises have been shown to be more effective in the treatment of chronic degenerative diseases than other therapeutic modalities. They also stimulate the autonomy of the individual to manage his or her illness[16-21].

Systematic meetings between health professionals and patients of an association of people with HTLV-1 in Salvador, Bahia, Brazil, led to the joint construction of a protocol for stretching and strengthening specific muscle groups. From this protocol, a booklet of home exercises was created[22]. However, there was a need to test its efficacy at reducing pain intensity and improving perceived QOL before its wide and safe application. The present study aimed to evaluate the impact of this home exercise program on the pain intensity and QOL of people with HAM/TSP.

METHODS

Study design

This randomized clinical trial followed the Consolidated Standards of Reporting Trials[23]. It included patients enrolled in the Multidisciplinary Reference Center for research and assistance to people with HTLV and relatives of the Teaching Outpatient Clinic of the Bahiana School of Medicine and Public Health located in Brotas, Salvador, Bahia, in 2014.

Recruitment/sample selection

Participants aged 18–64 years were included after diagnostic confirmation was made on enzyme-linked immunosorbent assay (Cambridge Biotech Corporation, Worcester, MA, USA) and western blotting (HTLV blot 2.4; Genelab, Singapore). The diagnosis of HAM/TSP was established according to criteria proposed by the World Health Organization (WHO) in 1988, revised in 1989[24], classified as definite or probable according to the criteria of Castro-Costa *et al*[25].

Patients with lower-limb prostheses or deformities affected by other orthopedic or neurofunctional conditions such as peripheral vestibular syndrome, difficulty understanding the instruments applied, or a frequency <80% and those who withdrew from the therapeutic program were excluded.

If the participants performed physiotherapy and/or physical activity, they were told to stay in these programs. Those who were not in any physiotherapy and/or physical exercise program were instructed not to initiate them during the proposed trial period.

The sample was calculated using the online calculator of the Laboratory of Epidemiology and Statistics of the University of São Paulo (http://www.lee.dante.br/pesquisa/amostragem/calculo_amostra.html). It was based on a clinical trial with supervised exercises in this same population, which found a standard deviation of 2.54 and a difference of 3 points on the visual scale of pain intensity between the test and control groups[14]. It was adopted with a standard deviation of 3, difference to be detected between the supervised group (SG) and the control group (CG) of 4, alpha of 5%, and power of 80%. From these parameters, a sample of 15 patients in each group was estimated and a possible loss of follow-up of 20% was added to the estimate, resulting in the need for 54 participants. An alternative hypothesis was adopted in which the patients who underwent supervised training would have a greater reduction of pain intensity than those in the control group.

Randomization

Randomization was performed by a researcher who did not participate in the recruitment, data collection, tabulation, and analysis of the results. After the initial evaluation, simple randomization was performed using a lottery of data with three groups, with numbers one and two being assigned to the SG, numbers three and four to the unsupervised group (UG), and numbers five and six to the control group (CG). Blinded participants could not be obtained during training. Participants in the SG participated in the protocol training twice weekly during the first 12 weeks of the intervention. In the 13th to 24th weeks, they performed the same exercise program at home guided exclusively by the booklet. Participants in the UG performed only the exercises at home using only the booklet as a guide. Participants in the CG maintained the usual care (feeding, medications, physiotherapeutic treatment) without any changes during the study period.

Intervention Procedures

In the SG, the exercise protocol was performed twice a week supervised by a physiotherapist with 11 years of experience. Each session lasted 45–50 minutes. All SG participants followed the same sequence of exercises. They performed 1–3 sets of 10 repetitions at 1-minute intervals between sets and 1–2 minutes between exercises. After reaching this mark, the intensity of each exercise evolved with increasing exercise range and/or weight (weight ankles, elastic band, and body weight).

Muscle strength was assessed to monitor progress and increase exercise load by applying the Omni scale[26]. The stress printed on the load should achieve an Omni scale score of 6–7. Anything below these values indicated a need for load lifting. Evaluation of the force and possible progression of the load was performed monthly in person, even at the second follow-up. Resting times were fixed over 24 weeks. The stretches were performed twice and positions maintained for 30 seconds each.

The exercise sequence was as follows: elongation of the posterior muscle chair; stretching of the hip, quadriceps, and ileopsoas adductors; upper-limb strengthening; trunk rotation exercise; trunk lateral tilt exercise; bridge, abduction, and hip adduction in the lateral decubitus; squatting; step training; and orthostatic plantarflexion.

The UG participants initially received clarifications from the physiotherapist about how to execute the exercise protocol and practiced the exercises on alternate days independently

guided by the booklet for 24 weeks individually at home. The procedures were the same as those established in the second period for the SG (from the 13th to 24th weeks).

To ensure adherence to the protocol, participants from both groups were contacted via phone to encourage adherence to the protocol, and each kept a journal of exercise notes (execution days, modalities, and relevant observations) and self-reported visual pain scale score.

Evaluation procedures

The evaluation protocol was performed in the same way in the three groups and by the same examiners at three moments: before starting the intervention, after 12 weeks, and after 24 weeks. The examiners were previously trained, as were the physiotherapists who conducted the intervention. A sociodemographic and clinical data sheet was completed to characterize the sample. The research volunteers answered a generic Short Form-36 health survey (SF-36) and Brief Pain Inventory (BPI) questionnaire according to the guidelines of the studies that validated them. Participants were identified by codes used to tabulate the data. Statistical analyses were performed and images were analyzed by an examiner who was blinded to the participants and study.

Statistical analysis

The data were tabulated and analyzed using the Statistical Package for Social Sciences version 17.0 (SPSS Inc., Chicago, USA). Analyses were performed to verify intergroup homogeneity. The Chi-square test was used to examine categorical variables, while analysis of variance or the Kruskal-Wallis test was used to examine numerical variables. The independent variable was the exercise protocol with or without supervision, while the dependent variables were the pain sensory parameters and reactions to the BPI and the SF-36 domain scores. The data were analyzed by the intention-to-treat method, repeating the worst results of the participants for the missing variables. The Friedman test was applied for analysis of the intragroup variance. In this analysis, the QOL scores and sensory parameters of pain and reactive pain before the intervention were inserted after the 12th and 24th weeks.

Ethics

This research originated from the Evaluation of an Exercise Program for Individuals with HAM/TSP: Randomized Clinical Trial approved by the Ethics Committee of the Bahia Foundation of Medicine and Public Health (CAAE number 13568213.8.0000.5544) and registered in the Brazilian Registry of Clinical Trials (RBR-849jyv/UTN: U1111-1176-2858). All authors report no conflicts of interest.

RESULTS

Data were collected from 272 medical records of people with HAM/TSP classified as definite or probable. Of the 106 patients who met the eligibility criteria, 56 agreed to participate in the survey (SG = 18, UG = 16, and CG = 15) and 49 completed the 24 weeks of the survey (SG = 15, UG = 10, and CG = 11). We observed the re-evaluation data for these people were missinabsence in some of the re-evaluation data for these people were missing of those who concluded the protocol in the three groups (SG = 5, UG = 4, and CG = 2), requiring use of the intention-to-treat model.

Table 1 shows the similarity of the three groups in all sociodemographic and clinical characteristics. In the three groups, female sex ($p = 0.867$), a non-white race predominance was observed, mean age between the fourth and fifth decades of life ($p = 0.331$), and the highest proportion of individuals with an educational level between incomplete elementary school and full secondary education were similar between groups. Both B and C social classes ($p = 0.270$) according to the Criteria of the Brazilian Association of Economic Research (ABEP Classification) were found in the SG and UG. In the SG, there was a predominance of active individuals ($p = 0.359$), but all were eutrophic ($p = 0.402$). Muscle relaxation and medications to reduce urinary symptoms were the most commonly used medications in the SG and CG; in the UG, pain relief medications were most common. Most of the individuals used gaiters ($p = 0.445$) and almost half of the sample had already completed physiotherapy ($p = 0.772$). The disease duration was 8–11 years in all three groups ($p = 0.880$).

The CG and UG presented an intensity pain score of 5 on the visual analog scale of BPI in the 24 hours before treatment, while the SG started with a pain score of 3. Although no significant changes were demonstrated after the exercise program when "worse pain experienced in the last 24 hours" was analyzed on the BPI, the SG presented increased intensity between the first and second evaluations ($p = 0.25$), while the CG presented worsening pain between the second and third evaluations ($p = 0.12$) and the UG maintained the value in the three evaluations ($p = 0.43$) (**Figure 1**).

There was also no significant difference in the "mean pain" of inflammatory bowel disease among the three groups. From the clinical point of view, however, a difference of 33% in pain improvement was observed in the UG ($p = 0.69$) and CG ($p = 0.58$), while the SG ($p = 0.78$) presented only 20% pain reduction (**Figure 2**).

When analyzing the effect of the home exercise program on the reactive aspects of pain, it was not possible to demonstrate positive impacts in the intragroup analysis (**Table 2**).

The intragroup analysis of the SF-36 scores showed a significant reduction only in the vitality domain of the CG ($p = 0.003$) as shown in **Table 3**. However, the median scores increased in the functional ($p = 0.617$, $p = 0.113$) and social ($p = 1.000$, $p = 0.395$) aspects of the SG and UG. The SG also had increased domain scores in the emotional ($p = 0.747$) and physical appearance ($p = 0.518$) factors, while the UG showed increased pain ($p = 0.254$) and mental health ($p = 0.437$) scores. On the contrary, the CG presented reduced scores in the domains of functional capacity ($p = 0.168$), physical aspects ($p = 0.485$), general state ($p = 0.157$), vitality ($p = 0.003$), and social $p = 0.942$) aspects of QOL.

An intergroup analysis of QOL (**Table 3**) indicates no differences among the three groups. In general, even without statistical significance, the SG presented a better QOL after the intervention.

TABLE 1: Sociodemographic and clinical characteristics of the supervised, unsupervised, and control groups of patients with definite or probable HAM/TSP from the EBMSP HTLV Reference Center, Salvador/Bahia, Brazil, 2014.

N = 49	SG n = 18 n (%)	UG n = 16 n (%)	CG n = 15 n (%)	p value
Sex				
Female	12 (66.7%)	11 (68.8%)	9 (60.0%)	0.867[a]
Age (years, M ± SD)	55.4 ± 10.5	53.3 ± 13.1	49.7 ± 8.7	0.331[b]
Color				-
White	0	2 (12.5%)	1 (6.7%)	
Black	10 (55.6%)	5 (31.3%)	10 (66.7%)	
Brown	8 (44.4%)	8 (50.0%)	4 (26.7%)	
Yellow	0	1 (6.3%)	0	
Schooling*				-
Illiterate	1 (5.6%)	0	0	
Incomplete elementary school	7 (38.9%)	5 (31.3%)	4 (26.7%)	
Complete primary education	4 (22.2%)	5 (31.3%)	3 (20.0%)	
Complete high school	3 (16.7%)	4 (25.0%)	6 (40.0%)	
Complete higher education	3 (16.7%)	2 (12.5%)	2 (13.3%)	
Social class - ABEP[d]				0.270[a]
Class B or C	11 (61.1%)	12 (75.0%)	7 (46.7%)	
Class D or E	7 (38.9%)	4 (25.0%)	8 (53.3%)	
Marital status				0.532[a]
Married	5 (27.8%)	6 (37.5%)	7 (46.7%)	
Not married	13 (72.2%)	10 (62.5%)	8 (53.3%)	
Occupation type				0.359[a]
Active	10 (55.6%)	5 (31.3%)	7 (46.7%)	
Inactive	8 (44.4%)	11 (68.8%)	8 (53.3%)	
Drugs				-
Do not use	7 (38.9%)	5 (31.3%)	5 (33.3%)	
Reduce pain	5 (27.8%)	6 (37.5%)	3 (20.0%)	
Muscle relaxant/reduce urinary symptoms	6 (33.3%)	4 (25.0%)	7 (46.7%)	
Immunomodulators	0	1 (6.3%)	0	
Driving device				0.445[a]
Does not use	7 (38.9%)	4 (25.0%)	7 (46.7%)	
Uses	11 (61.1%)	12 (75.0%)	8 (53.3%)	
Physiotherapy				0.772[a]
Yes	10 (55.6%)	7 (43.8%)	7 (46.7%)	
No	8 (44.4%)	9 (56.3%)	8 (53.3%)	
Disease duration (years, Md- IIQ)	10(6-15)	11(5.5-13)	8(6-13)	0.880[c]
BMI (kg/m², M ± SD)	23.5 ± 5.0	24.1 ± 3.6	25.5 ± 3.9	0.402[b]

SG: supervised group; **UG:** unsupervised group; **CG:** control group; **BMI:** body mass index; **Md:** median; **IIQ:** interquartile range; [a]chi-square; [b]analysis of variance; [c]Kruskal-Wallis; $p < 0.05$; [d]Criteria of the Brazilian Association of Economic Research ABPE - 2013.

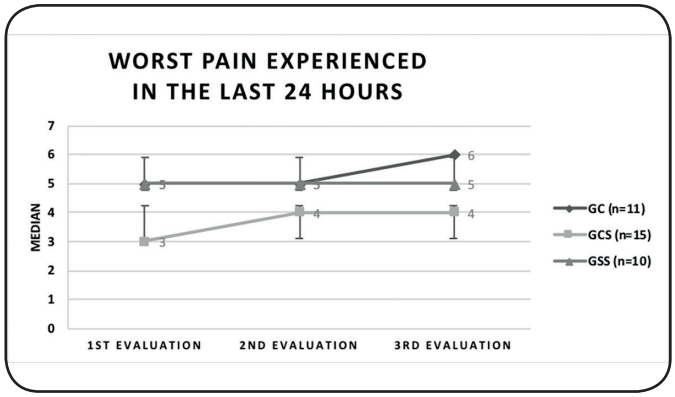

FIGURE 1: Evolution of the "Worst pain experienced in the last 24 hours" in people with PET/HB who participated in a home exercise program with or without supervision in the 1st evaluation (baseline) and after 12- (2nd evaluation) and 24-week evaluations. **CG:** control group; **SG:** supervision group; **UG:** unsupervised group. Friedman test, α ≤ 0.05, statistical power 80%. In the present analysis, p was >0.05.

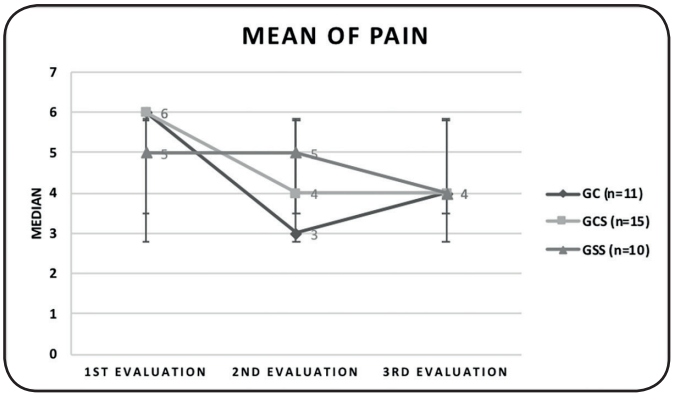

FIGURE 2: Evolution of the "Mean of pain" in people with HAM/TSP participating in a home-based exercise program with or without supervision at baseline after 12 weeks (2nd evaluation) and 24 weeks (3rd evaluation) of follow-up, 2013–2016. Salvador Bahia Brazil. **CG:** control group; **SG:** supervision group; **UG:** unsupervised group. Friedman's test, α ≤ 0.05, statistical power 80%. P > 0.05.

TABLE 2: Intragroup analysis of the effect of the exercise program on the reactional aspects of pain in individuals with HAM/TSP, 2013–2016. Salvador/ Bahia, Brazil.

Variable	GROUP Total (N = 36)	1st evaluation Md (IIQ)	2nd evaluation Md (IIQ)	3rd evaluation Md (IIQ)	*P intragroup
	SG (n = 15)	1.0 (0.0-8.0)	1.0 (0.0-6.5)	3.0 (0.5-3.5)	0.281
General activity	UG (n = 10)	3.5 (0.0-5.0)	3.0 (0.0-4.0)	2.5 (0.0-5.0)	0.965
	CG (n = 11)	0.0 (0.0-3.0)	1.0 (0.0-6.0)	4.0 (0.0-5.0)	0.130
	SG (n = 15)	2.5 (0.0-7.5)	0.0 (0.0-6.0)	0.0 (0.0-3.0)	0.567
Humor	UG (n = 10)	0.0 (0.0-8.0)	5.0 (0.0-7.0)	1.0 (0.0-5.0)	0.167
	CG (n = 11)	0.0 (0.0-2.0)	0.0 (0.0-4.0)	3.0 (3.0-7.0)	0.096
	SG (n = 15)	4.5 (1.0-7.5)	1.0 (0.0-7.5)	3.0 (0.5-7.5)	0.076
Ability to walk	UG (n = 10)	4.0 (2.0-8.0)	5.0 (2.0-8.0)	5.5 (0.0-8.0)	0.882
	CG (n = 11)	0.0 (0.0-8.0)	4.0 (0.0-7.0)	5.0 (3.0-10.0)	0.112
	SG (n = 15)	3.0 (0.0-8.5)	0.0 (0.0-6.0)	2.0 (0.0-4.0)	0.442
Job	UG (n = 10)	3.0 (0.0-9.0)	2.0 (0.0-6.0)	5.0 (0.0-10.0)	0.857
	CG (n = 11)	0.0 (0.0-8.0)	5.5 (0.0-8.0)	3.0 (0.0-7.0)	0.853
	SG (n = 15)	0.0 (0.0-3.5)	0.0 (0.0-5.5)	0.0 (0.0-4.5)	0.998
Relationship with other people	UG (n = 10)	1.0 (0.0-6.0)	0.0 (0.0-2.0)	2.5 (0.0-6.0)	0.769
	CG (n = 11)	0.0 (0.0-2.0)	0.0 (0.0-4.0)	0.0 (0.0-1.0)	0.978
	SG (n = 15)	0.0 (0.0-4.0)	0.0 (0.0-5.0)	4.0 (0.0-7.0)	0.085
Sleep	UG (n = 10)	3.5 (0.0-7.0)	0.5 (0.0-6.0)	2.0 (0.0-7.0)	0.595
	CG (n = 11)	0.5 (0.0-4.0)	0.5 (0.0-9.0)	1.0 (0.0-5.0)	0.692
	SG (n = 15)	0.0 (0.0-6.5)	1.0 (0.0-5.5)	0.0 (0.0-5.0)	0.823
Ability to enjoy life	UG (n = 10)	2.5 (0.0-7.0)	2.0 (0.0-5.0)	2.5 (0.0-8.0)	0.641
	CG (n = 11)	2.5 (0.0-4.0)	0.5 (0.0-10.0)	5.0 (0.0-5.0)	0.434

*P value assigned to α ≤ 0.05 and power of 80% (Friedman's test). **SG:** supervised group; **UG:** unsupervised group; **CG:** control group; **Md:** median; **IIQ:** interquartile range.

TABLE 3: Intergroup and intragroup analysis of the SF-36 quality of life questionnaire domains of the supervised, unsupervised, and baseline control groups at 12 and 24 weeks of the clinical trial (median [interquartile range]). HTLV Reference Center/EBMSP, Salvador, Bahia, 2014.

Variable	GROUP Total (N = 36)	*P intragroup	1st evaluation Md (IIQ)	**P intergroup	2nd evaluation Md (IIQ)	**P intergroup	3rd evaluation Md (IIQ)	**P intergroups
Functional capacity	SG (n = 18)	0.617	37.5 (20.0-65.0)	**0.024***	37.5 (23.8-55.0)	0.173	42.5 (23.8-60.0)	0.206
	UG (n = 16)	0.113	25.0 (5.0-33.8)		27.5 (15.0-38.8)		35.0 (15.0-45.0)	
	CG (n = 15)	0.168	35.0 (20.0-50.0)		30.0 (20.0-35.0)		30.0 (15.0-40.0)	
Physical appearance	SG (n = 18)	0.518	0.0 (0.0-75.0)	0.578	25.0 (0.0-75.0)	0.634	37.5 (0.0-100)	0.218
	UG (n = 16)	0.216	25.0 (25.0-50.0)		25.0 (0.0-43.8)		25.0 (0.0-75.0)	
	CG (n = 15)	0.485	25.0 (0.0-75.0)		0.0 (0.0-75.0)		0.0 (0.0-50.0)	
Pain	SG (n = 18)	0.943	51.5 (28.8-66.0)	0.772	51.5 (41.0-72.0)	0.387	51.0 (31.8-72.0)	0.547
	UG (n = 16)	0.254	42.0 (21.3-78.5)		41.0 (22.0-59.3)		51.0 (24.3-75.8)	
	CG (n = 15)	0.587	42.0 (31.0-72.0)		61.0 (22.0-72.0)		41.0 (21.0-62.0)	
General state	SG (n = 18)	0.494	57.5 (39.0-77.0)	0.533	52.0 (36.5-67.0)	0.421	52.0 (32.5-62.0)	0.665
	UG (n = 16)	0.154	59.5 (28.8-67.0)		46.0 (21.3-61.5)		46.0 (21.3-66.8)	
	CG (n = 15)	0.157	50.0 (27.0-67.0)		42.0 (25.0-60.0)		42.0 (30.0-57.0)	
Vitality	SG (n = 18)	0.982	55.0 (36.3-70.0)	0.697	52.5 (20.0-70.0)	0.968	40.0 (30.0-72.5)	0.303
	UG (n = 16)	0.754	47.5 (16.3-70.0)		45.0 (16.3-70.0)		50.0 (16.3-70.0)	
	CG (n = 15)	**0.003***	45.0 (35.0-80.0)		55.0 (20.0-65.0)		25.0 (5.0-55.0)	
Social aspect	SG (n = 18)	1.000	62.5 (50.0-90.6)	0.401	81.3 (56.3-90.6)	0.876	75.0 (50.0-90.6)	0.659
	UG (n = 16)	0.395	50.0 (25.0-87.5)		62.5 (31.3-100)		62.5 (17.5-87.5)	
	CG (n = 15)	0.942	75.0 (50.0-75.0)		75.0 (37.5-87.5)		50.0 (37.5-87.5)	
Emotional aspect	SG (n = 18)	0.747	33.3 (0.0-100)	0.535	83.3 (0.0-100)	0.847	66.6 (0.0-100)	0.882
	UG (n = 16)	0.593	66.7 (0.0-100)		83.3 (8.3-100)		50.0 (0.0-100)	
	CG (n = 15)	0.117	33.3 (0.0-100)		66.7 (0.0-100)		33.3 (0.0-100)	
Mental health	SG (n = 18)	0.804	72.0 (48.0-86.0)	0.531	68.0 (52.0-81.0)	0.963	68.0 (43.0-80.0)	0.514
	UG (n = 16)	0.437	68.0 (37.0-91.0)		70.0 (33.0-88.0)		82.0 (38.0-91.0)	
	CG (n = 15)	0.683	52.0 (44.0-72.0)		72.0 (32.0-92.0)		56.0 (40.0-80.0)	

P value assigned to $\alpha \leq 0.05$ and power of 80%. *Friedman´s test; **Kruskal-Wallis´s test. **SG,** supervised group; **UG,** unsupervised group, **CG,** control group; **Md,** median; **IIQ,** interquartile range.

DISCUSSION

This study aimed to evaluate the impact of a home exercise program applied over 24 weeks in patients with definite or probable HAM/TSP on pain and QOL. The results suggested that the application of the exercise protocol generated a small degree of pain relief but did not affect the reactional aspects of pain or QOL except for the loss of vitality observed in the CG, which was statistically significant.

The fact that the randomization allocated more physically active people to the SG may have influenced the results. By already practicing regular physical activity, patients in this group could already be developed, whereas those in the UG and CG may have had a better response because it was a new challenge as shown by a study that compared the physiological responses of beginners and sports veterans[27].

Another factor that may have influenced outcomes related to allocation is the fact that the UG more often used painkillers. It is possible that pain, regardless of intensity, is perceived by this group as a less tolerable phenomenon. However, the subjectivity of pain interpretation will always be a source of bias in studies involving chronic pain conditions[28].

Although no significant intra- or intergroup differences in

pain intensity were found, other complex and multidimensional factors may have interfered with our findings. It has been suggested that relevant clinical differences in responders to analgesic interventions should be greater than 30% to ensure that the outcome is related to the intervention itself and not to the placebo effect or spontaneous cure[29]. In the present study, the pain intensity of the SG and CG exceeded the 30% mark by the end of the follow-up versus 20% in the UG. It appears more relevant to interpret this finding from a clinical rather than a statistical point of view since the comparison of means in small and heterogeneous samples is limited for expressing what actually occurred with the participants. Thus, physical exercise supervision may not reduce pain intensity.

The reactional attitudes toward pain presented high intergroup heterogeneity, as some worsened over time but others improved. The time between evaluations may have been insufficient for observing significant differences in the different groups. Because there are behavioral phenomena involved, the responses may require more time to manifest[30].

With regard to QOL, we noted improvement in functional capacity scores in the SG and UG. Although no statistically significant differences were found, the exercises themselves, done in a supervised group or individually without supervision, had positive effects. The findings of the present study reinforce what was found in previous studies. Functional exercises[6,22], Pilates exercises[14], proprioceptive neuromuscular facilitation[15], and other modalities should be among the recommendations for symptom control in this population. They also allow us to affirm that the exercise booklet is a therapeutic alternative for people living far from urban centers as was also observed by Facchinetti in 2013[11].

The fact that the pain domain improved in only the UG reinforces the idea that autonomy is a relevant factor in the recovery from chronic pain conditions[28]. Because it is a degenerative and evolutionary condition, the perception of worsening of the general state of health in the three groups revealed progressive losses in health that require the attention of health policies[31].

In all domains of QOL, median scores decreased in the CG. This fact points to the rapid progression of the disease in this population. Although the existence of three distinct clinical groups (rapid, moderate, and slow evolution) is clear from the physical point of view, QOL is much more comprehensive from the perspective of those suffering from degenerative and progressive conditions and involves emotional and social aspects that should not be overlooked in the follow-up of affected patients[32,33].

The heterogeneity of the responses, with high dispersion measures, constitutes a limitation of the statistical analyses. However, because it is a rare condition found within the limits required by the eligibility criteria recommended by the WHO, the results support the clinical interpretation of the findings. Future studies should monitor the effect of use of the booklet over time and evaluate the impact of the protocol on locomotion and the perspective of those affected by qualitative studies.

It can be concluded that the protocol tested generated little pain relief in the three groups, being higher in the UG, and reduced losses in the functional capacity of QOL in the SG and UG.

Acknowledgments: We offer our deepest thanks to the institutions that provided technical support for the development and implementation of this study.

Conflict of Interest: The authors declare no conflicts of interest.

Financial Support: The study was financed by the authors.

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