Occupational therapy integrated with a self-administered stretching programme on systemic sclerosis patients with hand involvement

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The authors intend to dedicate this paper to Professor Antonio Spadaro, respected and beloved scientist of the Sapienza University, who passed away on May 13th 2014. He was Professor of Rheumatology in the course for Occupational Therapists, thus intellectually conceiving and taking actively part in the present manuscript.

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ABSTRACT

Objective. *To evaluate the effect of occupational therapy (OT) intervention, integrated with a self-administered stretching programme on the hands of patients with SSc, after one and three months of treatment.*

Methods. *We enrolled 31 patients with SSc, randomly allocated to the occupational group (15 patients) or to the control group (16 patients). Each patient received specific outcome measures: Canadian Occupational Performance Measure (COPM), HAQ, Short-Form Health Survey (SF-36), Duruoz Hand Index (DHI), reassessed after 1 (T1) and three months (T2).*

Results. *At T1 and T2 we found a statistically significant improvement from baseline values of COPM Performance and COPM Satisfaction in the OT group compared to baseline. At T2 HAQ values and Mental SF36 were also significantly improved. In the control group we found a statistically significant improvement of HAQ values and Mental SF36 at T1, confirmed at T2. COPM Performance was also significantly improved. The comparison between the two groups showed a greater improvement in the OT group concerning COPM Performance at T1 and T2. Mental SF-36 score greater improved in the control group at T1.*

Conclusion. *Our results indicate that a rehabilitation programme including OT and self-administered stretching exercises may be effective to improve and maintain hand function in patients with SSc.*

Introduction

Hands are greatly involved in most patients with systemic sclerosis (SSc) regardless the type of the disease (1). Each patient can experience range of motion limitation or loss of wrist motion in all planes. Metacarpophalangeal (MCP) flexion, proximal interphalangeal (PIP) extension and thumb abduction, opposition and flexion can be limited, distal interphalangeal (DIP) joint may become fixed in midrange flexion, thus resulting in a claw type deformity with MCP extension, PIP flexion, thumb adduction and the wrist in neutral position (2-4). Hand involvement in SSc is a serious concern, leading to functional disability highly influencing daily life activities in these patients (5-7).

Occupational therapy (OT) is a skilled treatment that helps individuals to achieve independence in all facets of their lives. OT is used in many therapeutic situations with the aim of promoting the ability to influence his or her own state of health. It is used in people of all age groups having occupation performance dysfunction resulting from illness, trauma, deprivation, stress or developmental insults and it has the purpose of preventing occupational performance dysfunction and remediating, habituating, or maintaining occupational performance skills for self-maintenance, work, leisure and play (8, 9). Actually there are no guidelines for the rehabilitation of SSc patients, and often OT interventions are not scientifically documented in these patients (10). Articular faces economy, construction of ortheses, gestural education do not offer to the customer a therapeutic intervention based on scientific evidence. A Japanese OT study on 45 SSc patients, without control group, showed an improvement of joint range of motion (ROM) and of Health Assessment Questionnaire (HAQ) scores after one month of treatment through a self-administered stretching exercise programme of the hand, both in diffuse and limited forms of the disease (11).

Stretching exercises stretch the muscle fibers with the aim of increasing muscle-tendon flexibility, improving ROM or musculoskeletal function, and preventing injuries. There are various types of stretching techniques including active, passive (relaxed), static, dynamic (gentle), ballistic (forced), isometric techniques, and others. Passive and active stretching exercises seem to reduce handicap, improve mobility and help to preserve function of the hand in these patients (12, 13).

The objective of this study was to evaluate the effect of OT intervention, integrated with a self-administered stretching programme of the hands, on functional ability, health status, personal perception and quality of life of patients with SSc after one and three months of treatment.

Patients and methods

We admitted to a randomised controlled, double blinded study, 31 patients with SSc, fullfilling the American College of Rheumatology criteria (14), consecutively referred to our Rheumatology Unit. All patients were able to speak and read Italian and had hand involvement defined as the presence of skin thickening with or without history of joint synovitis, joint contractures, tendon friction rubs, digital ulcers. All patients had a stable disease, defined as the absence of active synovitis and digital ulcers. No patient underwent any OT intervention before. After obtaining informed consent, patients were randomly allocated to the occupational group or to the control group. The study was blindly conducted, in such a way that neither the patient nor the OT evaluator were aware of the group to which they belong. To maintain the blindness, only the OT evaluator admistered the outcome measures and worked separately from a second occupational therapist, unblinded, that taught the patients how to perform the exercises. At the first visit both groups were informed of the general OT aims and their medical history, social status and awareness of the disease were recorded. Then at baseline the OT blinded evaluator administered the specific outcome measures to each patient in both groups. In the OT group the unblinded occupational therapist analysed the main occupation affected by the reduction in manual handling, due to joint or periarticular tissue involvement, identified by each patient. Then the unblinded occupational therapist analysed patient's routine, to identify the most appropriate time to perform stretching exercises and, when necessary, reprogramme it in order to have a positive impact on the quality of performance of the occupations identified by the patient as a priority. The unblinded occupational therapist also provided general guidelines on the most appropriate gestures to maintaining good tissue elasticity during patient activity, then proceeded to teach the self-administred stretching exercises with demonstration and supervised repetition. Fig. 1 a,b,c and Fig. 2 illustrate the exercises to be performed on each finger of both hands.

The blinded occupational therapist and the patient meet each other after one month (Time T1) and after three months (Time T2) of self-administred stretching exercises, when the outcome measures were reassessed. Between the first and the second assessments, each

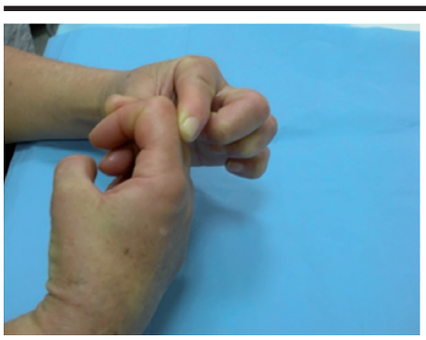


Fig. 1a. MCP flexion

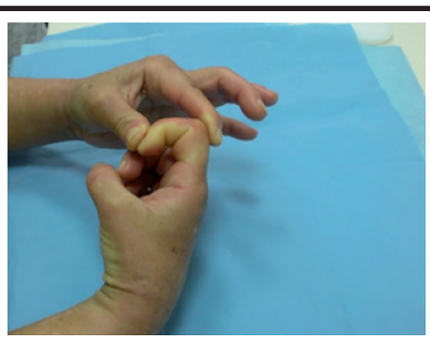


Fig. 1b. PIP and DIP flexion

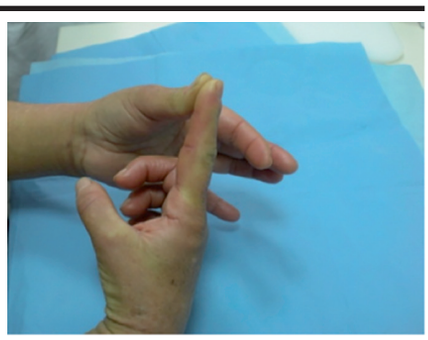


Fig. 1c. PIP and DIP extension

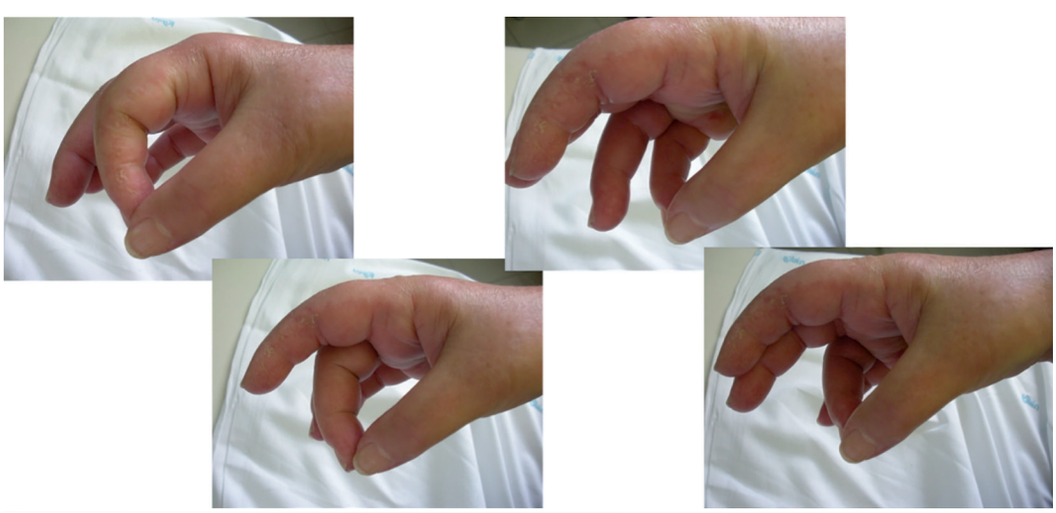


Fig. 2. Active ROM of finger -pinch strength.

patient received a weekly phone call to evaluate implemented changes in their daily life activities if any. In the control group the unblinded occupational therapist only acquired information from each patient, without identifying a specific timetable to perform stretching exercises, giving general indications to carry out the exercises once a day. The outcome measures used at T0, T1 and T2 were: Canadian Occupational Performance Measure (COPM), to describe and measure the perception of the subject in the execution of the Performance and Satisfaction that ensues (15, 16); HAQ, to explore functional disability on the main activities of daily life (17-19); Short-Form Health Survey (SF-36), a tool to explore the general quality of life concerning physical and mental components (20, 21); Duruoz Hand Index (DHI), to assess function of both hands in the main activities of daily life (22-24).

Statistical analysis

The statistical analysis was performed using, for continuous variables, the Mann-Whitney test for independent samples and the Wilcoxon test for paired samples. Results were expressed as median and 25°-75° percentile and were considered significant for *p*-values <0.05.

Results

No statistically significant difference was found between the two groups concerning the main clinical-demographic data (Table I).

At T1, one month from the beginning of the study, in the OT group a statistically significant improvement from baseline values of COPM Performance ($p<0.0001$) and COPM Satisfaction ($p<0.02$) was found (Table II). These results were confirmed at T2, after three months of treatment, with statistically significant improvements in COPM Performance ($p<0.0001$) and COPM Satisfaction ($p<0.007$) compared to baseline (Table II). Besides at T2 HAQ value ($p<0.0009$) and Mental SF36 ($p<0.03$) showed statistically significant improvements (Table II).

In the control group we found statistically significant improvements in the value of HAQ ($p<0.01$) and Mental SF36 ($p<0.0002$) at T1 (Table III). Those results were confirmed at T2 both for HAQ ($p<0.0085$) and Mental SF36 ($p <0.0001$) (Table III). Moreover at T2 a statistically significant improvement in COPM Performance ($p<0.04$) (Table III) was found. The comparison between the two groups showed a statistically significant difference concerning COPM Performance, with greater improvements in the OT group respect to the control one at T1 ($p<0.04$) and at T2 ($p<0.02$). (Fig. 3). Besides at T1, we found a statistically significant difference in the Mental SF36 score with a greater improvement in the control group ($p<0.04$) (Fig. 4). However this improvement was not confirmed at T2.

Table I. Main clinical and demographic data of SSc patients in the OT group and in the control group.

		OT Group (n=15)	Control Group (n=16)
Sex (F:M/%)		15:0/100	15:1/93
Mean Age (yrs)		61.4	60.5
Mean disease duration (yrs)		10.8 (range=2-50)	14.06(range=2-50)
Form	Diffuse (n/%)	7/46.6	5/ 31.2
	Limited (n/%)	8/53.3	10/62.5
Previous digital ulcers (n/%)		5/33.3	6/37.5
Hand oedema (n/%)		3/20	5/31.2
Previous hand synovitis (n/%)		2/13.3	3/18.7
Hand articular contractures (n/%)		4/26.6	4/25
Rodnan skin score (mean)		11.7	10.7
Pulmonary fibrosis (n/%)		5/33.	5/31.2
Pulmonary arterial hypertension (n/%)		3/20	3/18.7
Capillaroscopic pattern	Early (n/%)	2/13.3	3/18.75
	Active (n/%)	6/40	7/43.75
	Late (n/%)	7/46.	6/37.5
ANA+ (n/%)		14/93.3	16/100
ACA+ (n/%)		3/20	5/31.2
Anti-Topoisomerase 1+ (n/%)		6/40	6/37.5

Table II. COPM, HAQ, SF36 and DHI values (median / 25°-75° percentile) at time T0, T1 and T2 in the OT patients group.

	T0	T1	T2
COPM Performance	5.75/4.5-6.5	6.7/5.6-7.3[a]	6.8/6.15-8[e]
COPM Satisfaction	6.5/5.8-7.1	7.2/5.9-8[b]	7/6.1-8.1[f]
HAQ	1.25/0.69-1.9	0.88/0.6-1.38	0.62/0.4-1.3[c]
Physical SF36	33.18/27.2-37.8	33.6/31.4-38	35.7/30.6-43.6
Mental SF36	34.5/28.9-40.8	48.4/34.3-43	38.6/35.2-44.9[d]
DHI	23/10-36.5	15/11.5-32	15/10-28

[a]$p<0.0001$;[b]$p<0.02$;[c]$p<0.0009$;[d]$p<0.03$; [e]$p<0.0001$;[f]$p<0.007$.

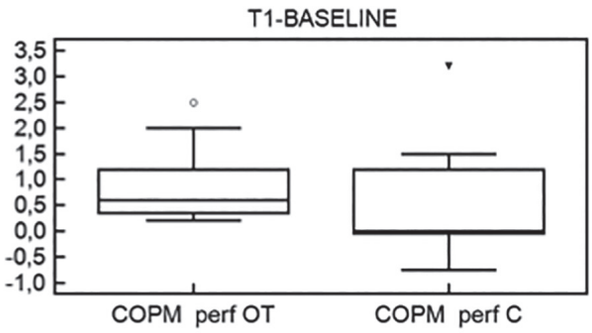
Table III. COPM, HAQ, SF36 and DHI values (median/ 25°-75° percentile) at time T0, T1 and T2 in the control group.

	T0	T1	T2
COPM Performance	5.27/4.6-6.4	5.53/4.9-6.7	5.4/4.7-7.1[e]
COPM Satisfaction	5.58/4.09-7.3	5.85/4.7-7.5	5.75/4.5-7.1
HAQ	1.44/1.1-2.1	1.13/0.9-1.8[a]	1.19/0.7-1.7[c]
Physical SF36	30.3/24.5-40.8	36.7/47.8-44.6	28.9/24.49-41.25
Mental SF36	32.9/29.8-37.4	39.2/31.1-23.1	39.2/33.3-49.4[d]
DH	27.5/15.7-49.2	23.5/13.5-49.5	21.5/22.7-45

[a]$p<0.01$; [b]$p<0.0002$; [c]$p<0.085$; [d]$p<0.0001$; [e]$p<0.04$.

Discussion

In patients with SSc, the mobility of the hands improves with connective tissue massage, passive manipulation of the joints, ROM exercises and stretching (12, 13). Recently, in Japanese SSc patients with hand involvement, in the absence of arthritis and skin ulcers, the use of self-administered stretching exercises showed an improvement of joint ROM and HAQ scores, already after one month of treatment. However, the main limits of this study are the absence of a patients-tailored



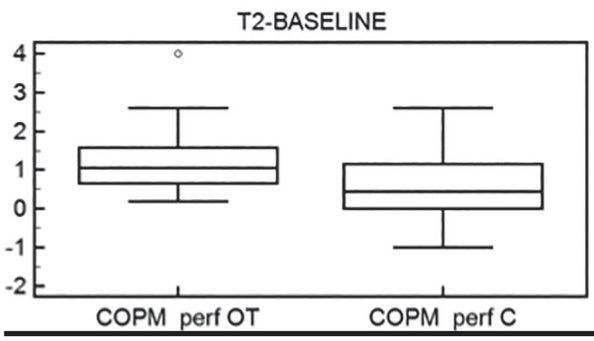


Fig. 3. Changes of COPM performance at T1 and T2 in the OT Group ($p<0,04$) and in the Control Group ($p<0,02$).

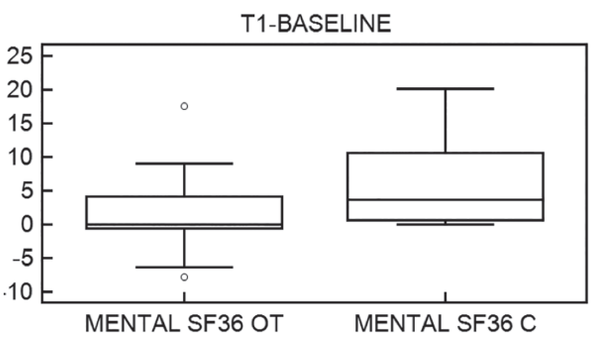


Fig. 4. Changes of Mental SF36 ($p<0,04$) at T1 in the OT Group and in the Control Group.

approach and of a control group (11). Moreover, the examined outcomes were ROM, which is not an indicator of functionality, and HAQ, which is an index of disability with no specificy on OT intervention. The use of specific tools to assess the effectiveness of OT is extremely important (25) and these limitations have been exceeded in our controlled double-blinded study. In fact the treatment plan was built by the unblinded occupational therapist together with patients, receiving a personalised and appropriate intervention for the employment needs. At the end of the treatment, the OT group had a statistically significant improvement concerning the performance and satisfaction values of COPM, a reliable instrument, validated in the Italian language and widely used in rheumatic diseases (16). COPM values further improved after three months (T2) in the OT group. Statistically significant improvements were also observed at T2 for HAQ and Mental SF36 values. An increase, although not statistically significant was also recorded for DHI and Phisical SF36 values. It is important to note that in the control group the improvement at T1 and T2 was for HAQ and Mental SF36 values only, already described as less specific tools, useful to investigate the global and mental health state of patients (11). In this group there was also a statistically significant improvement in COPM performance after three months only. The comparison of changes from baselines at T1 and T2, showed that the OT group had a higher significant improvement in COPM performance compared with the control group, further demonstrating the effectiveness on the performance of OT intervention integrated with a stretching programme. The differences among COPM results, in OT *versus* control groups, can be explained by the fact that COPM is a specific questionnaire built for OT intervention and is patient-centered, further suggesting that the occupational therapist can successfully use this tool for the evaluation of patient's global response to intervention. Previous clinical studies documented the utility of COPM in different rheumatic diseases such as osteoarthritis (15), rheumatoid arthritis (26), ankylosing spondylitis (16) and in limited SSc too (7). In a case-control study the disabilities of patients suffering from SSc was described using COPM and the authors showed that women with limited SSc are more dissatisfied in the activities of daily life, in working habits and in the self-care, compared to healthy control women, because of easy fatigue, dyspnea and pain (5, 7). COPM is currently used in more than 25 countries worldwide, and is a valid, reliable, clinically useful, comprehensive outcome measure, acceptable both by occupational therapists and researchers (25). We want to underline how OT intervention, in patients with SSc and clinical involvement of hands, can significantly improve the performance and the satisfaction in those activities of daily life identified as a priority. Just because stretching exercises improved general indicators such as HAQ and SF36 in both groups, their inclusion within a programme of OT is important to achieve a greater and an earlier answer at least in the performance and in the activities of daily living. Our results indicate that a rehabilitation programme including OT and self-administered stretching exercises for the fingers may be effective to improve and maintain the function of the hands in patients with SSc.

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