

Improve social support after a stroke through modified constraint-induced therapy

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ABSTRACT

Aims: To evaluate the effectiveness of collective versus individual neurorehabilitation in improving the social support for patients who have suffered a stroke. **Methods:** A randomized clinical trial was conducted, in which 36 post-stroke patients participated; they worked for three hours per day for ten days with constraint-induced movement therapy, divided into two treatment types: collective and individual therapy. **Social support** was assessed at the beginning and end of the study using the medical outcomes study-social support survey (MOS-SSS). **Results:** Monitoring the pre-treatment scores, a covariance analysis indicated that social support presents significant differences in favor of collective therapy. **Conclusion:** Both treatment types improved social support for post-stroke patients. However, the clinical and practical effectiveness of collective therapy was significant.

Keywords: Constraint-induced movement therapy, Neurological rehabilitation, Social support, Stroke

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INTRODUCTION

Rehabilitation, as an integral and multidisciplinary process, must aim to support the patient and his family, promoting social reintegration through effective therapeutic strategies in order to improve functional independence in the basic and instrumental activities of daily life [1]. Reeber suggests that the level of recovery and the results obtained in the rehabilitation of patients with a disability can depend on the ability of the family [2] and the environment to provide support, given that this individual becomes a considerable responsibility for the family [3]. Consequently, social and family support becomes fundamental in maintaining health, improving it and preventing secondary psychopathologies. Bowling defines social support as an interactive process, in which an individual obtains emotional, instrumental and economic aid from his social network [4].

Various therapeutic strategies are used during the rehabilitation process, one of which is constraint-induced movement therapy (CIMT), a behavioral technique with broad scientific evidence [5, 6] that has proven effective in the rehabilitation of the paretic upper extremity and which induces a cortical reorganization in the injured area [7], enabling a better perception of use of the arm in activities of daily living (ADL) and transferring

these improvements to the patient’s real world [8]. The purpose of this therapy is to improve the sensory and motor function of the upper extremity in an attempt to reduce the disability and promote social participation [1]. In order to assess whether collective treatment improves the social support for post-stroke patients, the original treatment protocol was modified (individual therapy for six hours) to collective therapy for three hours. This is based on the benefits of collective work, referring to improvement in social support networks, the principle of universality and the amount of information, because the sources of information and experience multiply. This offers a wide margin for the exchange of ideas and emotional support [9], stimulates the rehabilitation process [10], and converts these improvements into functional independence and social participation [11]. The aim of this study was to compare neurological rehabilitation in collective and individual therapy in terms of the improvement of the social support for post-stroke patients.

MATERIALS AND METHODS

Study Design

A single-blind randomized clinical trial was conducted, comprised of two parallel branches (collective and individual); the primary outcome was the improvement in social support.

Population and Sample

We identified 120 patients belonging to the Temuco (Chile) community rehabilitation centre; of these 76 did not meet the inclusion criteria and eight did not agree to take part, leaving a sample consisting of 36 patients. Subjects were individually randomized into the collective modality or individual modality by using a table of random numbers (Figure 1). They signed an informed consent form, and the trial was authorized by the Ethics Committee of Universidad de La Frontera.

The sample size was calculated by considering the number of subjects with neurological pathologies who are admitted monthly to the rehabilitation center ($n = 40$), based on an estimate of the minimum significant difference between the groups that corresponds to 10% of the dependent variable. There were two groups, estimating a 10% loss, a 5% significance level and a statistical power of 0.80.

The inclusion criteria were: aged between 30 and 80 years, with a single event of stroke confirmed by CT, with an evolution greater than six months [12], able to sit down independently, having obtained between 5 and 14 points on the National Institute of Health Stroke Scale (NIHSS), fewer than 2 points on the Modified Ashworth Scale, fewer than 4 points on the Visual Analog Scale and

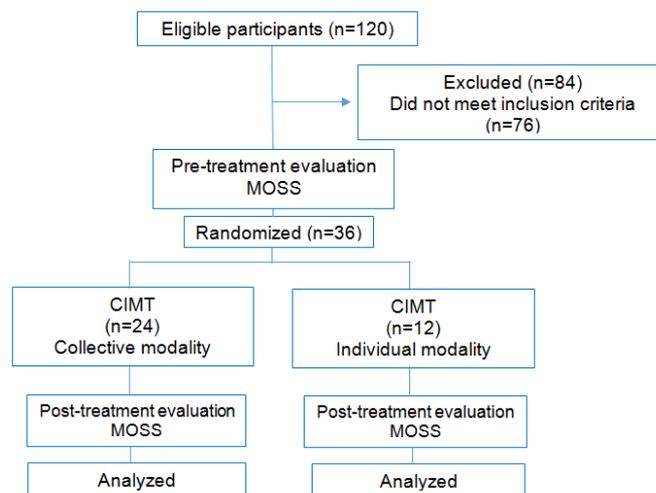


Figure 1: Study design, constraint-induced movement therapy. The diagram showing the sequence involved in the clinical trial, describing recruiting, assessments and intervention.

a score over 14 points on the abbreviated mini-mental state examination. Subjects who presented sensory impairment (visual-auditory) and orthopedic limitation (cane use) were excluded.

Outcome measurement

In order to evaluate social support, the medical outcomes study-social support survey (MOS-SSS) was used. Developed in its original version by Sherbourne and Stewart, it is a widely used questionnaire with suitable psychometric properties that evaluates social support for patients with chronic diseases. The MOS-SSS was validated and adapted in Spain and is used in Chile [13, 14].

The instrument is made up of 20 items: the first quantifies the social network, asking about the number of close friends and relatives the respondent has. The following items are answered according to a Likert scale from 1 (never) to 5 (always) and investigate overall social support in four dimensions (Table 1).

The total score ranged from 19 to 95 points: the higher the score, the greater the social support.

Procedure

The recruitment was conducted from March to June 2014 by the coordinator of the city’s rehabilitation center. The information was compiled using a clinical record that included data related to the control variables: age, gender, dominance, type of stroke and time of evolution. One week prior to the therapy, a trained and biased evaluator performed the pre-test and at the end of the therapy performed the post-test under the same conditions. Evaluators do not know that intervention group patients belonged.

Table 1: Medical Outcomes Study-Social Support Survey

Dimensions	Definitions	Questions
Emotional/Informational	Referring to the expression of affection and empathic understanding, as well as guidance and the giving of advice and information.	3-4-8-9-13-16-17-19
Instrumental Support	Described as any domestic help the person may be receiving.	2 - 5-12-15
Positive Social Interaction	Referring to the availability of people with whom the respondent can go out, have fun or relax.	7-11-14-18
Affective Support	Described as expressions of love, affection and empathy.	6-10-20

The treatment protocol corresponding to the independent variable was applied in both groups simultaneously for three hours per day for ten days by a physiotherapist with expertise in the area and student assistants.

The collective intervention included six groups, each made up of four patients (n = 24), and the other 12 patients were treated individually.

The protocol applied in both groups consisted of three main elements: task-oriented repetitive training, inducement to use the affected upper extremity and transfer package.

1. Task-Oriented repetitive training: These various repetitive exercises simulate ADL aimed at training the affected upper extremity. The goal is to increase the amount and extension of use of the extremity through the accomplishment of motor tasks.
2. Inducement to use the affected upper extremity: This is the restrictive component of the therapy, using a glove that prohibits use of the undamaged hand for most functional activities, mainly when the physiotherapist is not present, i.e., outside therapy. The goal is to use the glove the greatest number of hours in the day, avoiding its use in activities like bathing and any activity that may pose a risk for the patient.
3. Transfer package: A set of three behavioral techniques (home diary, problem solving and behavior contract) that endeavor to empower the patients responsible for adherence to the treatment requirements.

The protocol used has wide scientific support, described in numerous international [5, 8].

In the following text, a therapy session is described:

The participants enter the therapy room, and after being welcomed, the home diary is reviewed, which describes the activities the patient has performed (with and without the glove) at home when not in therapy and which is part of the transfer package. This activity is shared with all the participants, since it provides an opportunity to share information, get feedback about the activities and to resolve any issues. Then, they begin the exercises through specific motor tasks: six previously

defined activities (patient-physiotherapist) that simulate ADL and involve movements of the shoulder, elbow, wrist and fingers using the glove. Each activity has its own requirements, parameters, progression and objective. In order to avoid fatigue, increased tone and demotivation, stretching is done between each exercise and rests periods are taken that allow participants to exchange experiences. This activity uses the highest percentage of hours during the therapy, approximately 70%.

The session ends by defining five specific tasks to be done at home using the glove in order promote use of the weak arm.

Data Analysis

The analysis included 36 individuals using the software SPSS v. 15.0; there were no losses during the treatment period.

Initially, an exploratory analysis of the variables was performed, including frequency distributions and classic summary measures, which were compared using the χ^2 test for independence, determining the characteristics of the sample. In addition, the internal consistency of the MOS-SSS was evaluated using Cronbach's alpha [15]. The behavior of the total scores on the questionnaire, expressed through averages and standard deviations, was examined by means of five intersubject one-way analyses of covariance, using the type of therapy as the independent variable, each of the five post-test scores from the MOS-SSS as the dependent variable and the corresponding pre-test scores from the MOS-SSS as the co variable. The confidence interval was 95% and the significance level was $p < 0.005$.

RESULTS

Sociodemographic and clinical characteristics

Table 2 presents the characteristics of the study population. The therapy groups are homogenous in all the variables except gender, as the sample was comprised mainly of men (61%).

Table 2: Sociodemographic and clinical characteristics of the participants

Variable	Type		Statistical test
	Collective	Individual	
Gender, f			$\chi^2(1) = 5.84^{**}$
Male	18	4	
Female	6	8	
Stroke type, f			$\chi^2(6) = 7.14$
Intracerebral hemorrhage	3	4	
Intracerebral hemorrhage unspecified	0	1	
Intracranial	3	0	
Precerebral stenosis occlusion	3	2	
Cerebral occlusion	12	4	
Acute stroke	2	0	
Indefinite stroke	1	1	
Age, AVE (SD)	58.33 (10.38)	48.75 (18.60)	F(1, 34) = 0.51
Spasticity, AVE (SD)	1.04 (0.46)	1.08 (0.52)	F(1, 34) = 0.06
Pain, AVE (SD)	1.46 (0.51)	1.25 (0.45)	F(1, 34) = 1.44
Evolution, AVE (SD)	25.63 (23.52)	39.00 (33.51)	F(1, 34) = 1.94
Mini Mental, AVE (SD)	16.58 (1.53)	16.75 (2.01)	F(1, 34) = 0.07

Note. f = frequency, AVE = Average, SD = standard deviation.

Internal consistency of the MOS-SSS

Reliability was corroborated through internal consistency, i.e., the degree to which the items of each domain on the questionnaire are empirically related to each other and therefore seem to measure the same construct. The alpha indices of the MOS-SSS by type of therapy and measurement time are given in Table 3.

The literature suggests the acceptable minimum value is 0.70 and this is sufficient for most purposes given that the correlations are attenuated very little by measurement error at this level [16]. The values obtained are within this range and are similar to those reported by other authors [13, 17].

Effectiveness of collective therapy in regaining social support

With regard to the social network, the average number of close friends and family at the beginning of collective therapy was 5.4 and in individual therapy it was 5.7, there were no significant differences between groups.

When checking the corresponding pre-test assessments, the analyses of variance showed that, with respect to the five MOS-SSS scores, the dependent variable showed significant differences in favor of collective therapy (Table 4).

Table 3: Internal consistency (Cronbach’s alpha) of the social support scores per measurement time (pre-test and post-test) and treatment type (collective and individual)

Support dimensions	Pre-test scores		Post-test scores	
	Collective	Individual	Collective	Individual
Emotional	0.88	0.97	0.89	0.94
Instrumental	0.64	0.75	0.67	0.70
Interaction	0.65	0.93	0.75	0.85
Affective	0.64	0.90	0.56	0.78
Total	0.89	0.97	0.90	0.96

Note. The parameter used was Cronbach’s Alpha.

Table 4: Effects of treatment type (collective and individual) on social support

Support dimensions	Pre-test scores		Post-test scores		ANCOVA	
	Collective	Individual	Collective	Individual	F	η^2_p
Emotional	25.6 (9.1)	27.7 (12.3)	27.5 (5.6)	25.7 (5.6)	3.70*	0.18
Instrumental	16.8 (3.8)	16.4 (3.8)	18.5 (3.4)	17.4 (2.3)	13.73***	0.45
Interaction	14.0 (4.1)	14.8 (5.2)	15.9 (2.7)	13.9 (2.8)	6.01**	0.28
Affective	12.5 (2.5)	12.9 (3.8)	13.7 (1.7)	11.5 (1.8)	12.81***	0.44
Total	68.8 (15.9)	71.8 (22.4)	74.4 (9.8)	68.7 (9.9)	5.80**	0.26

Note. Scores are reported as averages (standard deviations). Post-test scores are adjusted for the respective pre-test scores.

*p < 0.05. **p < 0.01. ***p < 0.001.

DISCUSSION

This study demonstrates that neurological rehabilitation in collective therapy produces a greater increase in social support for post-stroke patients than individual therapy after the application of 10 days of CIMT.

Although there are numerous treatment strategies that seek to rehabilitate patients with pathologies of this nature [18], there are very few that propose working in a collective intervention and which evaluate variables like social support [19, 20].

We have found no evidence in literature of other studies that measure social support in this type of population and with this treatment type.

Collective therapy cannot be defined by opposition to individual therapy as there are clear implications of the collective dimension in individual treatment. This is because everyone is involved in a context where a series of relationships are maintained, thus any action at the individual level takes on a group dimension in the situation, facilitating the existence of relationships suitable to the environment [21].

On the other hand, in the collective dimension, there is an implication of the individual dimension, as the personal aspects (abilities, motivations, attitudes, etc.) are present in the group work processes.

Considering the results obtained, collective therapy improves social support by involving the different dimensions evaluated, through the work dynamics generated by this treatment type, the social relationships and networks, and the abilities and potential of the people and groups aimed at collective improvement.

This treatment type promotes the development of personal autonomy, i.e., the individual ability to face and solve problems directly, accepting one's shortcomings and confronting them, satisfying basic human needs such as like security, affection, sense of belonging and self-esteem [22].

In addition, a greater amount of information is received, sources of experience and information multiply, which offers a wide margin for the exchange of ideas,

feelings and other experiences. This helps the patient control anxiety, reducing one of the principal dimensions of depression and stress. The support groups discuss subjects of mutual interest as a result of their disability. In addition, they provide specific information about how others have moved on, presenting the same problem and providing the patients with an opportunity to share their emotions with people with the same limitations [23]. It also achieves universality in terms of the appreciation of the common problems, which contributes to patients being less focused on them while feeling challenged in their rehabilitation process.

At the same time, it favors the dimension of social and emotional support; there is evidence that social/emotional support is a key factor in adjustment to the disease and recovery [24]. This support can manifest in various ways. For example, creating a climate of trust, encouragement, and allowing them to express their feelings and concerns freely, as well as putting them in contact with others. Another process related to social/ emotional support is the process of social comparison in terms of health and adjustment to disease [25]. This assumes that people assess their own abilities, attitudes and characteristics by comparing them with other similar people, and that when individuals are afraid of something, they will seek to join with others who are going through a similar situation to reduce their anxiety level.

Furthermore, collective therapy promotes family support for patients with chronic diseases, stimulating physical and emotional functioning and favoring treatment adherence. Family members cannot only remind the patient about the activities he needs to do, but also participate in the activities together with the patient.

During the two weeks of therapy, the four dimensions assessed in the MOS-SSS were reinforced, emphasizing informational/emotional support and positive interaction. The sessions produced a dynamic of work, mutual support and competitiveness that led the participants to perform their exercises with greater motivation, dedication and commitment, which was expressed in a greater use of the extremity in ADL and subsequently promoted their social participation.

Limitations include the sample size, which although it is sufficient to detect the effect, does not make it possible to obtain more precise estimators or to explore other associations in patients who present this pathology, as well as the non-inclusion of other variables, such as depression, due to its high prevalence and impact on the quality of life of these patients [26].

CONCLUSION

This intervention becomes a tool that could improve the rehabilitation of these patients in different spheres, one being social support. High levels of social support are associated with a faster and more extensive recovery of the functional state after a stroke.

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Author Contributions

Arlette Doussoulin – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Jose Luis Saiz – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Jasim Najum – Conception and design, Acquisition of data, Analysis and interpretation of data, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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