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Original Article

The effect of early systematic rehabilitation nursing on the quality of life and limb function in elderly patients with stroke sequelae

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Abstract: Objective: To study the effect of early systematic rehabilitation nursing on the quality of life and limb function in elderly patients with stroke sequelae. Methods: This prospective study was conducted in 97 elderly patients with stroke sequelae. These patients were randomly allocated to the control group (n=49) and the experimental group (n=48). Patients in the control group received routine rehabilitation nursing, while those in the experimental group received early systematic rehabilitation nursing. Upper limb motor function (Fugl-Meyer assessment (FMA) score), upper limb sensory function (tactile threshold and two-point discrimination), physiological state (Hamilton anxiety (HAMA) scale and Hamilton depression (HAMD) scale score), ability of daily living (ADL) (the Barthel index score and ability of daily living score), and the quality of life (generic quality of life inventory-74 (GQOLI-74) score) before and 3 months after intervention were compared between the two groups. Results: Compared with before intervention, FMA scores in the two groups after intervention were increased, while modified Ashworth scores were decreased (all P<0.05). The changes in the experimental group after intervention were more than those in the control group (both P<0.05). Tactile threshold and two-point discrimination in both groups after intervention were reduced when compared with before intervention (all P<0.05); tactile threshold and two-point discrimination in the experimental group after intervention group were smaller than those in the control group (both P<0.05). HAMA scale and HAMD scale scores in the two groups after intervention were lower than those before intervention (all P<0.05); HAMA scale and HAMD scale score in the experimental group after intervention were reduced when compared with the control group (both P<0.05). The Barthel index scores, ADL scores, and GQOLI-74 scores in both groups after intervention were increased when compared with before intervention (all P<0.05). The Barthel index score, ADL score, and GQOLI-74 score in the experimental group after intervention were higher than those in the control group (all P<0.05). Conclusion: For elderly patients with stroke sequelae, early systemic rehabilitation nursing is more beneficial for the improvement of upper limb motor and sensory function, alleviation of negative psychology, raise in ability of daily living, and increase of life quality. It is therefore worthy of clinical application.

Keywords: Period of stroke sequelae, early systematic rehabilitation nursing, limb function, the quality of life

Introduction

Stroke is the main disease that induces disability and death among Chinese residents. It is most commonly observed in middle-aged and elderly people. Most stroke survivors suffer from sequelae such as limb motor and cognitive dysfunction, which not only influence their daily life, but also trigger negative psychology like anxiety [1, 2]. Therefore, it is extremely important to provide appropriate rehabilitation intervention measures for elderly patients with stroke sequelae to improve their various limb functions, raise their quality of life, and promote their better return to the society and family [3].

Early systematic rehabilitation nursing is a novel model, which is developed by combing rehabilitation medicine and systematic nursing. To be specific, it is patient-centered during the rehabilitation process. In addition, a system composed of factors such as patients' physical, psychological, and social state is established. With the participation of patients, family members, and rehabilitation physicians, compre-

hensive and systematic rehabilitation nursing is applied in patients to reduce or prevent the occurrence of disability and improve the quality of life [4]. Recently, the significance of early systematic rehabilitation nursing in the rehabilitation process of stroke patients has become increasingly prominent. For example, it was reported that when early systematic rehabilitation nursing was implemented in stroke patients as early as possible, the improvement of their language function and swallowing disorders was more significant [5, 6]. However, there are not many studies on the limb motor and sensory function in patients with stroke sequelae. Here, we provided systematic nursing measures, such as health education, training of ability of daily living, limb exercise, psychological care, diet nursing, cognitive intervention, and family care, for patients to explore the impact of early systematic rehabilitation nursing on the quality of life and limb function in elderly patients with stroke sequelae.

Materials and methods

General information

This prospective study was conducted in 97 elderly patients with stroke sequelae who received treatment in our hospital between February 2019 and January 2020. These patients were randomly divided into the control group (n=49) and the experimental group (n=48). This study was approved by the Ethics Committee of our hospital.

Inclusion criteria: Patients aged between 60 and 75 years; patients who met the diagnostic criteria for ischemic stroke, which were defined in the Chinese Guidelines for Diagnosis and Treatment of Acute Ischemic Stroke (2014) [7]. Patients who had a Glasgow coma score over 8 points; Patients who couldn't move freely due to severe lower limb dysfunction, systemic dysfunction, hemiplegia, and so on; Patients who had high compliance and could actively cooperate with medical staff to perform the designated rehabilitation therapy; Patients who signed the informed consent.

Exclusion criteria: patients who had brain diseases, like head trauma and brain tumors; patients that suffered from severe cognitive impairment or Alzheimer's disease; patients who had speech or swallowing disorders after stroke; patients who suffered from severe dysfunction in important organs, such as the heart, liver, and kidney; patients who participated in other studies at the same time.

Methods

Patients in both groups were treated with routine therapy for ischemic stroke, including improvement of cerebral circulation and nourishment of brain nerves. In the control group, patients received routine rehabilitation nursing, which was composed of health education, active control of intracranial pressure, blood pressure, blood sugar, and guidance on diet.

Patients in the experimental group received early systematic rehabilitation nursing [8, 9]. It is described in detail below. (1) Health education: knowledge relevant to the disease and the importance of active cooperation during treatment and early recovery were explained to patients with simple and understandable language after their condition was stable. Also, patients were informed of issues that needed attention for the rehabilitation process. By doing so, they were aware of the importance and necessity of actively performing rehabilitation therapy. As a result, they would proactively and enthusiastically cooperate during the rehabilitation period. The rehabilitation therapy was carried out 1 to 2 times a week until patients were discharged. (2) The training of ability of daily living: nursing staff instructed patients to move on their own. They gradually learned to turn over, take off and put on clothes, get up, get out of bed, go to the toilet, brush teeth, wash face, and do other activities of daily living. Precautions on patients' mobility training were explained to patients' family members. They could thus help patients to perform the training. The training was conducted in accordance with patients' specific situations, step by step, and without rush. (3) Limb exercise: After the patients' condition was stabilized, the rehabilitation nurse assisted patients to complete in-bed training such as turning over, getting up, sitting down, and moving around in bed as early as possible. They also informed patients in the skill of turning over from the healthy and unhealthy side. Based on patients' condition, the rehabilitation nurse guided patients to conduct out of bed training (like standing on the ground, sitting down, and walking) and standing balance training. The training was per-

formed 3 times a day. According to patients' actual situation, the training was sustained 10-30 min each time. For patients unable to move on their own, the rehabilitation physician helped them to complete passive movement of the affected limb. To prevent joint contracture of the affected limb, the movement was started from the large joint and ended at the small joint, with a slow speed. It was taken 3 times a day, for 20-30 min each time until active and voluntary movement of the affected limb was resumed. For patients with spasticity, continuous anti-spasm training was carried out to assist them to alleviate and control the abnormal movement pattern of muscles and the continuous occurrence of spasms. With the improvement of patients' conditions, they were assisted to perform standing balance and stair climbing training. (4) Psychological care: nursing staff frequently communicated with patients and comforted their emotions to enhance their confidence in overcoming the disease. During the communication process, attention was paid to patients' psychological changes. For patients with large psychological and emotional fluctuations, targeted psychological counseling was offered in time to eliminate or relieve their negative psychology. In this way, their coordination with rehabilitation training was increased. In addition, attention was paid to the adjustment of patients' cognition to eliminate their incompetence and assist them to realize their importance to the family and society. By doing so, they would take a positive attitude to their situation and cooperate to complete rehabilitation therapy. (5) Diet care: nursing staff or nutritionists formulated a low-salt and low-fat diet plan for patients according to Dietary Guidelines for Stroke Patients (People's Republic of China Health Industry Standard Number: WS/T558-2017). In this way, animal saturated fatty acids and sugar intake was decreased. Additionally, patients ate more vegetables and fruits, drank plenty of water, had a bland diet, quit smoking, and limited the intake of alcohol. (6) Cognitive intervention: with the method of cognitive reconstruction, the trained nurse helped patients find their negative thinking patterns, such as unreasonable and negative beliefs and misunderstanding of the disease. They instructed patients to establish an active cognition model to improve their own abnormal cognition. (7) Family care: before leaving the hospital, the main caregivers received discharge family care education and training to make sure patients receive a good care at home. After 3 months, the effect of rehabilitation intervention in both groups was assessed.

Outcome measures

Main outcome measures: (1) Fugl-Meyer assessment (FMA) scale was implemented to evaluate the upper limb motor function before and after intervention [10]. The scale was composed of 33 items, including the coordination ability and stabilization of upper limb joints. The total score was 66 points; the higher the score was, the better the upper limb motor function. (2) Upper limb sensory function was compared between the two groups before and after intervention. To be specific, Aesthesto sensory threshold measurement and Mackinnon two-point discrimination test were used to measure tactile threshold and two-point discrimination, respectively [11, 12]. The average value obtained from two independent tests was used for comparison. (3) Modified Ashworth scale (MAS) was used to evaluate the muscle tension of the wrist flexor before and after intervention [13]. The score ranged from 0 to 6 points; normal wrist flexor muscle tension was 0 points, while stiff passive flexion and extension was 6 points.

Secondary outcome measures: (1) Hamilton anxiety scale (HAMA) and Hamilton depression scale (HAMD, 17 items) were used to assess the physiological state before and after intervention [14, 15]. The higher the HAMA score, the more sever the anxiety was. Similarly, the higher the HAMD score, the more sever the depression was. (2) The Barthel index and ability of daily living (ADL) scale was applied to evaluate the functional status of activities of daily living and ability of daily living before and after intervention, separately [16, 17]. The total score of each scale was 100 points. The higher the Barthel index score was, the better the functional status of activities of daily living. Likewise, the higher the ADL score was, the stronger the ability of daily living. (3) Generic quality of life inventory-74 (GQOLI-74) was implemented to evaluate the quality of life before and after intervention [18]. The total score ranged from 76 to 380 points. The higher the score, the better the quality of life was.

Table 1. Baseline data ($\bar{x}$ ± sd, n)

Group	Experimental group (n=48)	Control group (n=49)	χ^2/t	P
Gender (n)			0.261	0.609
Male	26	24		
Female	22	25		
Age (years)	66.6±4.5	67.4±4.2	0.905	0.368
BMI (kg/m^2)	23.35±3.20	23.54±3.43	0.282	0.778
Causes of stroke (n)			0.273	0.601
Cerebral hemorrhage	20	23		
Cerebral infarction	28	26		
Hemiplegic side (n)			0.257	0.612
Left side	25	23		
Right side	23	26		
Underlying disease (n)				
Hypertension	30	32	0.083	0.774
Hyperlipidemia	6	9	0.639	0.424
Diabetes	8	4	1.617	0.203
Smoking history (n)			0.500	0.480
Present	20	17		
Absent	28	32		
Drinking history (n)			0.300	0.584
Present	17	20		
Absent	31	29		
Education background (n)			0.730	0.393
Below junior high school	43	41		
Above senior high school	5	8		

Note: BMI: body mass index.

Statistical methods

All data were analyzed using SPSS statistical software version 20.0. The enumeration data was expressed as number/percentage (n/%); comparison was conducted with chi-square test. The normally distributed measurement data were calculated as mean ± standard deviation ($\bar{x}$ ± sd); independent sample t test was used for inter-group comparison, while paired t-test was applied for before-after comparison within the same group. The difference was statistically significant when *P* value was less than 0.05.

Results

Baseline data

There were no significant differences in baseline data between the two groups (all P>0.05, **Table 1**).

FMA and MAS score

As shown in **Table 2**, FMA scores in both groups after intervention were increased when compared with those before intervention, while MAS scores were decreased (all P<0.05). The changes in the experimental group after intervention were more than those in the control group (both P<0.05).

Upper limb sensory function

As displayed in **Table 3**, tactile threshold and two-point discrimination in the two groups after intervention were smaller than those before intervention (all P<0.05). Tactile threshold and two-point discrimination in the experimental group after intervention were reduced when compared with the control group (both P<0.05).

Physiological state

As shown in **Table 4**, HAMA and HAMD scores in the two groups after intervention were decreased when compared with before intervention (all P<0.05). HAMA and HAMD score in the experimental group after intervention were lower than those in the control group (both P<0.05).

The Barthel index and ADL score

As displayed in **Table 5**, the Barthel index and ADL scores in both groups after intervention were higher than those before intervention (all P<0.05). The Barthel index and ADL score in the experimental group after intervention were increased when compared with the control group (both P<0.05).

GQOLI-74 score

As shown in **Table 6** and **Figure 1**, GQOLI-74 scores in the two groups after intervention were increased when compared with before intervention (both P<0.05). GQOLI-74 score in

Table 2. FMA and MAS score ($\bar{x}$ ± sd, score)

Group	Time	FMA score	MAS score
Experimental group (n=48)	before intervention	40.59±5.44	4.08±1.04
	after intervention	51.10±5.85*,#	2.42±0.89*,#
Control group (n=49)	before intervention	40.11±4.32	4.22±1.10
	after intervention	46.69±5.30*	3.30±0.94*

Note: FMA: Fugl-Meyer Assessment; MAS: modified Ashworth scale. Compared with before intervention, *P<0.05; compared with control group, #P<0.05.

Table 3. Upper limb sensory function ($\bar{x}$ ± sd)

Group	Time	Tactile Threshold (g)	Two-Point Discrimination (mm)
Experimental group (n=48)	Before intervention	5.11±1.44	12.09±2.66
	After intervention	3.30±1.08*,#	8.04±1.70*,#
Control group (n=49)	Before intervention	5.35±1.30	11.91±2.30
	After intervention	4.14±1.17*	9.49±1.88*

Note: Compared with before intervention, *P<0.05; compared with control group, #P<0.05.

Table 4. HAMA and HAMD score ($\bar{x}$ ± sd, score)

Group	Time	HAMA score	HAMD score
Experimental group (n=48)	Before intervention	7.14±1.35	8.03±1.45
	After intervention	5.66±1.66*,#	5.20±1.37*,#
Control group (n=49)	Before intervention	7.30±1.08	7.99±1.29
	After intervention	6.42±1.20*	6.37±1.42*

Note: HAMA: Hamilton anxiety scale; HAMD: Hamilton depression scale. Compared with before intervention, *P<0.05; compared with control group, #P<0.05.

Table 5. The Barthel index and ADL score ($\bar{x}$ ± sd, score)

Group	Time	The Barthel index score	ADL score
Experimental group (n=48)	Before intervention	63.39±5.40	70.07±5.50
	After intervention	77.70±6.33*,#	79.97±6.77*,#
Control group (n=49)	Before intervention	62.85±5.97	69.70±6.64
	After intervention	69.98±5.86*	73.46±6.38*

Note: ADL: ability of daily living. Compared with before intervention, *P<0.05; compared with control group, #P<0.05.

the experimental group after intervention was higher than that in the control group (P<0.05).

Discussion

The mortality rate of elderly stroke patients is relatively high. In addition, survivors are accompanied by different degrees of sequelae. Traditional treatment and nursing mainly focus on life saving. In other words, the importance of various physiological functions such as limb function, motor function, and the quality of life during the period of stroke sequelae is relatively less emphasized [19]. In the medical community, a consensus on the application of early rehabilitation nursing in patients with stroke sequelae has been made. What' more, it was reported that the earlier the rehabilitation nursing was implemented, the better the recovery effect in the later period [20, 21].

Limb motor and sensory dysfunction are two common sequelae of stroke survivors. Limb motor dysfunction can induce hemiplegia, while sensory dysfunction can make patients lose sensation or have abnormal sensation. Accordingly, patients' daily life is severely influenced and their quality of life is declined. Moreover, adverse effects are made on their psychological state [22]. In our study, FMA scores in both groups after intervention were increased when compared with before intervention, while MAS scores, tactile threshold, and two-point discrimination were decreased. In addition, all changes in the experimental group after intervention were more than those in the control group. These results indicated that early systemic rehabilitation nursing is pretty beneficial for improving limb motor and sensory function, and reducing muscle tension of the wrist flexor. These were consistent with the results reported by Hu et al. [23]. In their study, the impact of two

Table 6. GQOLI-74 score ($\bar{x}$ ± sd, score)

Group	Time	GQOLI-74 score
Experimental group (n=48)	Before intervention	169.69±14.93
	After intervention	188.85±13.38*,#
Control group (n=49)	Before intervention	168.86±15.04
	After intervention	180.80±14.49*

Note: GQOLI-74: Generic quality of life inventory-74. Compared with before intervention, *P<0.05; compared with control group, #P<0.05.

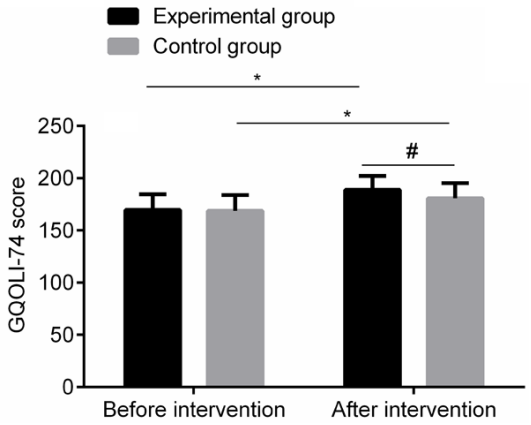

Figure 1. Comparison of GQOLI-74 score before and after intervention. GQOLI-74: Generic quality of life inventory-74. Compared with before intervention, *P<0.05; compared with control group, #P<0.05.

types of rehabilitation nursing on the limb function of stroke patients was studied. They found that the improvement of limb function in patients receiving early systematic rehabilitation nursing was greater. It is speculated that this might be related to the limb exercise carried out in early systemic rehabilitation nursing. The input and output activities of motoceptor and cerebral cortex are caused by in-bed, off-bed, and standing balance training. Therefore, the reconstruction of nerve function in brain tissue is promoted, and limb motor function is gradually improved.

For stroke patients, rehabilitation training is a long process. Due to various factors like the influence of disease and the concern of rehabilitation effect, some patients may suffer from negative psychological problems. When the condition is severe, they are even accompanied by symptoms like anxiety and depression [24]. Early systematic rehabilitation nursing includes not only limb exercise but also psychological care. For patients with large psychological and emotional fluctuations, targeted psychological counseling is immediately provided to eliminate or relieve their negative psychology. In our study, HAMA and HAMD scores in both groups after intervention were lower than those before intervention; HAMA and HAMD score in the experimental group after intervention were reduced when compared with the control group. These results suggest that early systematic rehabilitation nursing is more helpful for the alleviation of negative psychology, like anxiety and depression, in elderly patients with stroke sequelae. Paolucci et al. also found that early systematic rehabilitation nursing could effectively relieve stroke patients' negative emotions [25]. The training of patients' ability of daily living is emphasized in early systematic rehabilitation nursing. The training, which consists of taking off clothes, going to the toilet, brushing teeth, and washing face, contributes to the improvement of patients' ability of daily living. In addition, multi-faceted nursing like limb exercise and psychological care, is provided for patients to improve their quality of life. In our study, the Barthel index scores, ADL scores, and GQOLI-74 scores in the two groups after intervention were increased when compared with before intervention; the Barthel index score, ADL score, and GQOLI-74 score in the experimental group after intervention were higher than those in the control group. These results imply that early systematic rehabilitation nursing is more beneficial for improving the ability of daily living, and quality of life in elderly patients with stroke sequelae.

However, there are some shortcomings. Firstly, this is a single-centered clinical study. Secondly, the sample size is small. Lastly, the rehabilitation of stroke patients is a long-term process, but we only explored the effect before and 3 months after intervention. Subsequently, a long-term follow-up study will be carried out to verify the effect of early systematic rehabilitation nursing on patients' long-term quality of life.

In summary, for elderly patients with stroke sequelae, early systemic rehabilitation nursing contributes more to their improvement of upper limb motor and sensory function, alleviation of negative psychology, raise of ability of daily living, and increase of life quality. It is worthy of clinical application.

Disclosure of conflict of interest

None.

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