

## Original Article

# Effect of cognitive behavior intervention on life quality of patients with stroke and the caregiving burden on their caregivers

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**Abstract:** To determine the effect of cognitive behavior intervention on the life quality of patients with stroke and the caregiving burden of their caregivers. A total of 200 patients with stroke who were treated in Hainan Provincial People's Hospital from January 2017 to January 2019 were enrolled and divided into two different patient groups according to the nursing mode (each n = 100), and the 200 corresponding caregivers of the patients with stroke were selected, and assigned to an observation group and a control group (each n = 100). Patients in the observation group were given cognitive behavior intervention, while those in the control group were given routine nursing. The limb recovery (Fugl-Meyer Assessment (FMA) score and Barthel index) and neurological function (National Institutes of Health Stroke Scale (NIHSS) score and Scandinavian stroke scale (SSS)) of the patients were evaluated, and the caregiving burden score (Zarit Burden Interview (ZBI) score) and positive feelings (positive aspects of caregiving (PAC)) of the caregivers were evaluated. In addition, the life quality, anxiety, and depression of the patients and caregivers were monitored and evaluated using the MOS 36-Item Short-Form Health Survey (SF-36), self-rating anxiety scale (SAS), and self-rating depression scale (SDS). Patients in the observation group had higher FMA scores and Barthel Index and lower NIHSS scores and SSS scores than the control group, and they also had lower caregiving burden scores and higher positive feeling scores, and had higher life quality scores and lower SAS and SDS scores than the control group. Cognitive behavior intervention has positive effect on patients with stroke, because it can significantly improve the life quality of patients and their caregivers, and lower the caregiving burden of the caregivers. Therefore, it is worthy of clinical promotion.

**Keywords:** Cognitive behavior intervention, stroke, ZBI, PAC, SF-36

## Introduction

Cognitive behavior intervention therapy is often adopted for various neural system diseases [1] and some other diseases such as depression and anxiety [2-4]. It has been verified to have positive effects in various diseases [5]; under it, tasks are assigned to each medical staff to help to direct the patients' thoughts and activities to a certain extent, and the patients' daily behaviors and thoughts are recorded to check their life style and thinking style [6]. Such a therapy often contributes to the interaction between the thoughts, emotions and behaviors of patients [7]. In addition, the therapy can be performed not only face to face, but also remotely via the Internet [8, 9]. In this study, we adopted this therapy to treat patients with stroke.

Stroke is caused by intracranial vascular occlusion due to atherosclerosis [10]. In most cases, these infarcts will block blood flowing to a part of the brain, causing ischemic necrosis of brain tissues in the brain area directly supplied by the blood vessel, and then resulting in infarction [11]. The prognosis of the middle-aged and the elderly with stroke is poor [12-15], and as such it greatly compromises their life quality. In serious cases, stroke will impair the normal movement of the patients, and eventually even result in disability and death [16, 17]. Moreover, caregiving for the patients may corner the patients themselves and their families into "adaptation" and "caregiving" troubles [18], which will greatly harm the mental health of caregivers and bring heavy burden to them [19]. There are few related studies on whether cognitive behavior intervention can

bring certain convenience to patients and their caregivers. Therefore, this study analyzed the effect of cognitive behavior intervention on patients and their caregivers based on indexes including life quality and caregiving burden.

### Materials and methods

#### *General materials*

**Methods:** A total of 200 patients with stroke treated in Hainan Provincial People's Hospital from January 2017 to January 2019 were enrolled and divided into two different patient groups according to the nursing mode (each  $n = 100$ ). The observation group consisted of 57 males and 43 females, with an average age of  $(60.31 \pm 10.73)$  years, while the control group consisted of 54 males and 46 females, with an average age of  $(59.85 \pm 10.69)$  years. This study was approved by the Ethics Committee of Hainan Provincial People's Hospital, and the patients' family members agreed and signed relevant consent forms.

A total of 200 corresponding caregivers of the patients with stroke were selected, and also assigned to an observation group and a control group (each  $n = 100$ ). The observation group consisted of 49 males and 51 females, with an average age of  $(38.25 \pm 17.30)$  years, and the control group consisted of 46 males and 54 females, with an average age of  $(40.01 \pm 16.47)$  years, and all caregivers also signed relevant consent forms. This study was approved by the Ethics Committee of Hainan Provincial People's Hospital.

#### *Inclusion and exclusion criteria*

**The inclusion criteria of the patients:** Patients whose symptoms were stable within the last month and without new stroke and those without brain tumors or other serious diseases that conflict with this study. **The exclusion criteria of the patients:** Patients with tumors or serious mental diseases such as anxiety, depression, and suicidal tendency.

**The inclusion criteria of caregivers:** Adult spouse, children, relatives, colleagues, and friends of the patient, with clear language skills. **The exclusion criteria of caregivers:** Nurses, nannies, and people with communication obstacles.

#### *Nursing methods and outcome measures*

Patients in the control group were given routine nursing as follows: Nursing staff were arranged to give health education and diet guidance and take on other conventional nursing measures for the patients, and the staff were also arranged to meet the needs of the patients as far as possible, inform the patients of matters needing attention, and detect their vital signs. Patients in the observation group were given cognitive behavior intervention as follows: First of all, a professional cognitive intervention team was set up with medical personnel with rich nursing experience. The team members were arranged to formulate corresponding targeted intervention measures for each patient according to the patient's own specific situation, and the members were only qualified to take intervention measures after passing an examination after intensive learning and training. After intervention nursing, the team members were arranged to detect indexes including neurological function indexes of the patients at the time of discharge, understand the current situation and caregiving burden of the patients' caregivers to a certain extent and the patients' needs, give some simple training and guidance to the caregivers to make them meet the requirements of the patients as much as possible and help them develop caregiving plans. In addition, the team members were arranged to teach caregivers some daily nursing measures for patients with stroke, some precautions and measures to prevent recurrence, treatment measures and solutions, as well as treatment measures for possible problems in the care process. The team members were also arranged to communicate with caregivers and train them to solve problems, inform them about relevant caregiving knowledge, and tell them the need of understanding the patients' psychological thoughts, communicating with the patients to help them eliminate negative psychological thoughts, learning correct communication methods, understanding the patients, taking the patients into consideration, and gaining their trust. Furthermore, the team members were arranged to assess the cognition of the caregivers and summarize the assessment, focus on training against deficiencies, enhance the caregiving ability of the caregivers, and answer their questions. In the meantime, the members were also required to

**Table 1.** General data of the two patient groups

Item	The observation group (n = 100)	The control group (n = 50)	t/X <sup>2</sup>	P-value
Sex			1.12	0.670
Male	57 (57.00)	54 (54.00)		
Female	43 (43.00)	46 (46.00)		
Age (Y)	60.31±10.73	59.85±10.69	0.30	0.762
BMI (kg/m <sup>2</sup> )	22.35±2.74	21.93±2.65	1.10	0.27
History of heart disease			1.00	0.318
Yes	53 (53.50)	60 (60.00)		
No	47 (47.00)	40 (40.00)		
History of hypertension			0.18	0.671
Yes	52 (52.00)	55 (55.00)		
No	48 (48.00)	45 (45.00)		
Diabetes history			0.02	0.886
Yes	41 (41.00)	42 (42.00)		
No	59 (59.00)	58 (58.00)		

*Statistical analyses*

Comprehensive data were statistically analyzed using the SPSS 22.0 (Asia Analytics Formerly SPSS, China). Enumeration data including data about sex, hypertension, hyperlipidemia, and diabetes of the patients and caregivers were analyzed using chi-squared test. Quantitative data were expressed as the ( $X \pm S$ ) and analyzed using the t test, including comparison of NIHSS and SSS scores between the observation groups and control groups.

assist and guide the caregivers in the process of patient recovery so that they can take better care of the patients. It was necessary to establish a communication group of caregivers to share experiences so as to promote better recovery of the patients.

The outcome measures covered the two groups of patients and caregivers. For patients, Fugl-Meyer Assessment (FMA) and Barthel Index were adopted to evaluate the limb recovery of the patients in the two groups [20, 21], and the National Institutes of Health Stroke Scale (NIHSS) and Scandinavian stroke scale (SSS) to score their neurological function recovery [22, 23]. For caregivers, the Zarit Burden Interview (ZBI) was adopted to score the caregiving burden of the caregivers before intervention, 3 months and 6 months after the intervention, mainly including personal burden and responsibility burden. A higher score indicated a heavier burden [24]. In addition, a positive aspect of caregiving (PAC) scale was adopted to score the positive feelings of the caregivers [25], and a higher score indicated stronger positive feelings. The MOS 36-Item Short-Form Health Survey (SF-36) was also adopted to score the life quality of the patients and caregivers [26], and a higher score indicated better life quality. Moreover, the self-rating anxiety scale (SAS) and self-rating depression scale (SDS) were used to score the anxiety and depression of the patients and caregivers before intervention, and 3 and 6 months after intervention, respectively.

**Results***General materials*

*General information of the patients:* There was no significant difference in general data such as sex, age, body mass index (BMI), history of heart disease, hypertension, and diabetes between the two patient groups ( $P > 0.05$ ) (**Table 1**).

*General information of the caregivers:* There was no significant difference between the two caregiver groups in general data such as sex, age, identity, place of residence, and working conditions (all  $P > 0.05$ ) (**Table 2**).

*Limb function of the patients*

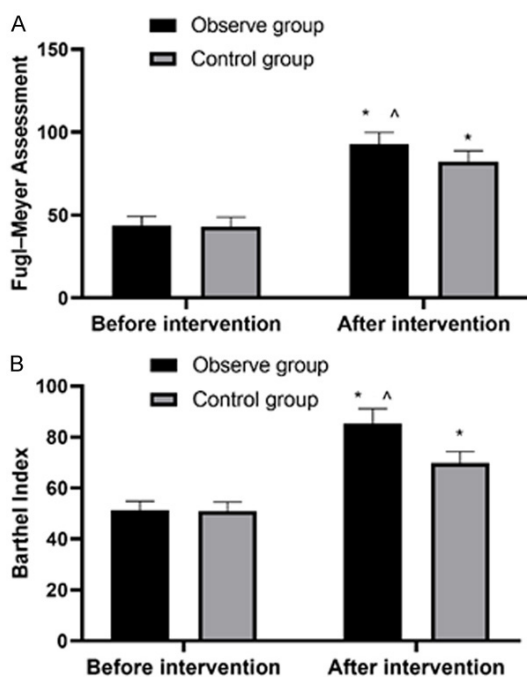
At 1 month after intervention, both groups had a higher FMA score, and the FMA score of the observation group was significantly higher than that of the control group ( $P < 0.05$ ). In addition, at 1 month after intervention, both groups had a higher Barthel index, and the Barthel index of the observation group was significantly higher than that of the control group ( $P < 0.05$ ) (**Figure 1**).

*Neurological functional recovery of the patients*

At 1 month after intervention, both groups had a lower NIHSS score, and the NIHSS score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ). In

**Table 2.** General data of the two caregiver groups

Item	The observation group (n = 100)	The control group (n = 50)	t/X <sup>2</sup>	P-value
Sex			1.12	0.670
Male	57 (57.00)	54 (54.00)		
Female	43 (43.00)	46 (46.00)		
Age (Y)	60.31±10.73	59.85±10.69	0.30	0.762
Identify			0.35	0.838
Spouse	42 (42.00)	40 (40.00)		
Children	38 (38.00)	42 (42.00)		
Others	20 (20.00)	18 (18.00)		
Place of residence			0.19	0.660
Live in a compact community	62 (62.00)	65 (65.00)		
Live in a non-compact community	38 (38.00)	35 (35.00)		
Job			0.58	0.447
Yes	93 (93.00)	90 (90.00)		
No	7 (7.00)	10 (10.00)		



**Figure 1.** Limb function of the two patient groups. A. After intervention, both groups had a higher FMA score, and at 1 month after intervention, the FMA score of the observation group was greatly higher than that of the control group ( $P < 0.05$ ). B. Barthel index of both groups increased after intervention, and Barthel index of observation group was significantly higher than that of the control group at 1 month after intervention ( $P < 0.05$ ). Note: \* indicates  $P < 0.05$  vs. the situation before treatment, and ^ indicates  $P < 0.05$  vs. the control group.

addition, at 1 month after intervention, both groups had a lower SSS score, and the score of

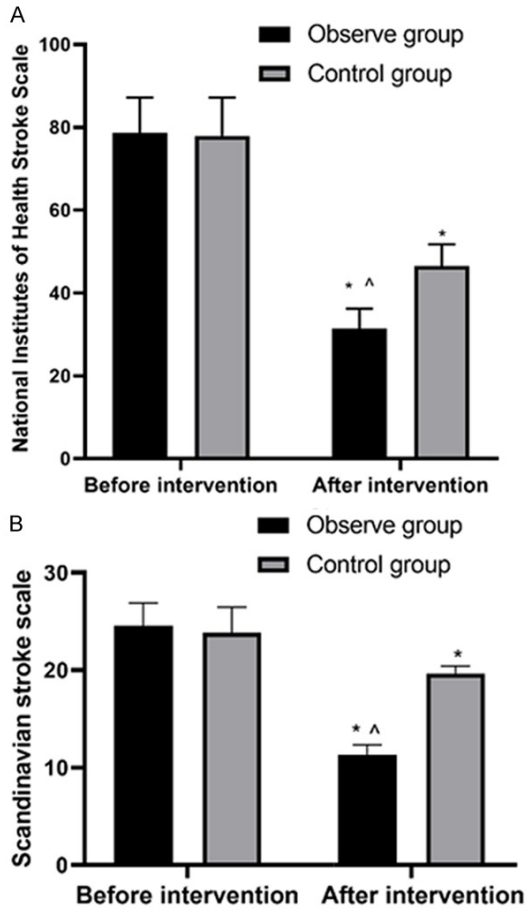
the observation group was significantly lower than that of the control group ( $P < 0.05$ ) (Figure 2).

*Caregiving burden score of the two caregiver groups*

The personnel burden score of the two groups decreased during 3 to 6 months after intervention, and the score of the observation group was significantly lower than that of the control group at 1 month after intervention ( $P < 0.05$ ). The responsibility burden score of the two groups also decreased during 3 to 6 months after intervention, and the score of the observation group was significantly lower than that of the control group at 1 month after intervention ( $P < 0.05$ ). In a word, the total caregiving burden score of the two groups decreased during 3 to 6 months after intervention, and the total score of the observation group was significantly lower than that of the control group at 1 month after intervention ( $P < 0.05$ ) (Figure 3).

*Positive feeling scores of the two caregiver groups*

The self-affirmation score of the two groups increased during 3 to 6 months after intervention, and the score of the observation group was significantly higher than that of the control group at 1 month after intervention ( $P < 0.05$ ). The life expectation score of the two groups increased during 3 to 6 months after intervention, and the score of the observation group

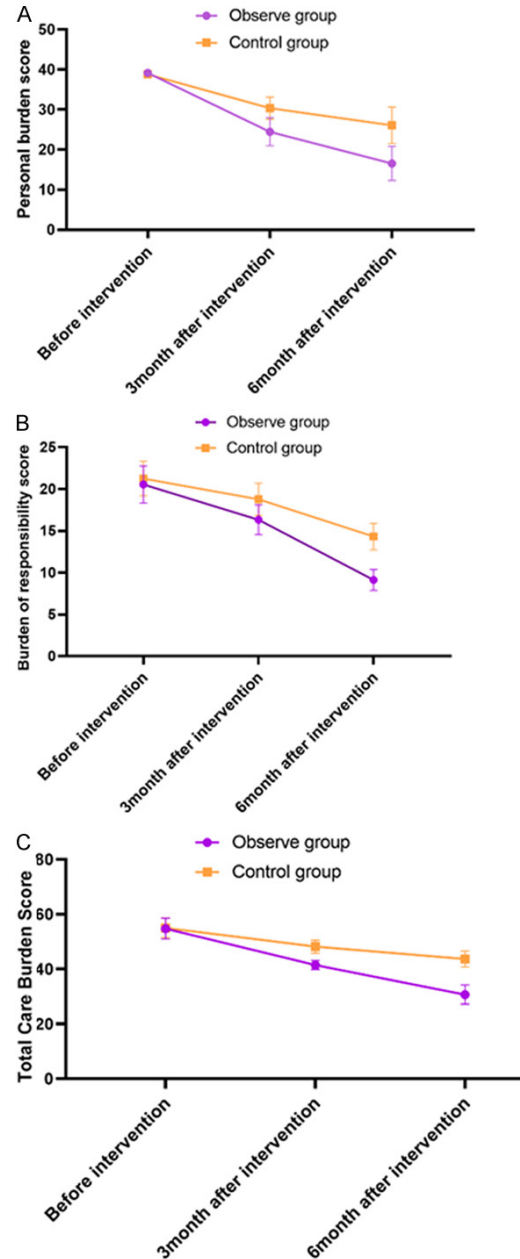


**Figure 2.** Neurological function of the two patient groups. A. After intervention, both groups had a lower NIHSS score, and at 1 month after intervention the NIHSS score of the observation group was greatly lower than that of the control group ( $P < 0.05$ ). B. SSS score of both groups decreased after intervention, and the SSS score of observation group was significantly lower than that of the control group at 1 month after intervention ( $P < 0.05$ ). Note: \* indicates  $P < 0.05$  vs. the situation before treatment, and ^ indicates  $P < 0.05$  vs. the control group.

was significantly higher than that of the control group at 1 month after intervention ( $P < 0.05$ ). Therefore, the total positive feeling scores of the two groups increased during 3 to 6 months after intervention, and the total positive feeling score of the observation group was significantly higher than that of the control group at 1 month after intervention ( $P < 0.05$ ) (Figure 4).

*Comparison of life quality between the two patient groups and between their caregivers*

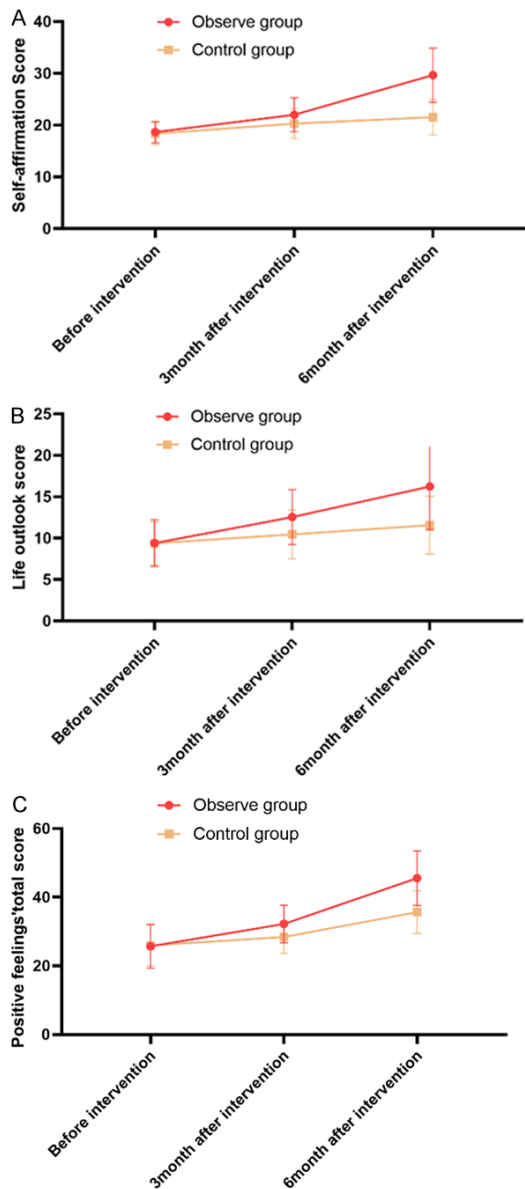
*Life quality of the patients:* The physiological function score, mental function score, social function score, and emotional function score of patients in the observation group we-



**Figure 3.** Caregiving burden score of the two caregiver groups. A. During 3 to 6 months after intervention, the personal burden score of both groups decreased, and the score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ). B. During 3 to 6 months after intervention, the responsibility burden score of both groups decreased, and the score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ). C. During 3 to 6 months after intervention, the total caregiving burden score of both groups decreased, and the total score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ).

re (71.84±7.78) points, (72.08±5.68) points, (70.33±6.43) points, and (75.49±5.76) points,





**Figure 4.** Positive feeling scores of the two caregiver groups. A. During 3 to 6 months after intervention, the self-affirmation score of both groups increased, and the score of the observation group was significantly higher than that of the control group ( $P < 0.05$ ). B. During 3 to 6 months after intervention, the life expectation score of both groups increased, and the score of the observation group was significantly higher than that of the control group ( $P < 0.05$ ). C. During 3 to 6 months after intervention, the total positive feeling scores of both groups increased, and the score of the observation group was significantly higher than that of the control group ( $P < 0.05$ ).

respectively, and the scores of patients in the control group were (67.84±6.35) points, (64.54±2.21) points, (61.23±2.89) points, and (68.32±4.44) points, respectively, Therefore, the life quality of patients in the observation

group recovered significantly better than that of the control group (Table 3).

*Life quality of caregivers:* The physiological function score, mental function score, social function score, and emotional function score of caregivers in the observation group were (89.54±11.87) points, (87.12±13.52) points, (85.46±12.65) points, and (87.78±14.21) points, respectively, and the scores of caregivers in the control group were (80.54±10.21) points, (78.54±7.32) points, (79.23±9.32) points, and (75.66±11.67) points, respectively, Therefore, the life quality of caregivers in the observation group recovered significantly better than that of the control group (Table 4).

*Comparison of anxiety and depression between the two patient groups and between their caregivers*

*Patients:* After 6 months of nursing, the SAS score of both patient groups decreased, and the scores of patients in the observation group were significantly lower than those in the control group ( $P < 0.05$ ). In addition, after 6 months of nursing, the SDS score of both patient groups also decreased, and the scores of patients in the observation group were also significantly lower than those in the control group ( $P < 0.05$ ) (Figure 5).

*Caregivers:* After 6 months of nursing, the SAS score of both caregiver groups decreased, and the scores of caregivers in the observation group were significantly lower than those in the control group ( $P < 0.05$ ). In addition, after 6 months of nursing, the SDS score of both caregiver groups also decreased, and the scores of caregivers in the observation group were also significantly lower than those in the control group ( $P < 0.05$ ) (Figure 6).

### Discussion

Although the purpose of this study was to analyze the effect on life quality and caregiving burden of caregivers of patients with stroke, we analyzed not only the situation of caregivers, but also the situation of patient, and we also analyzed the relationship between patients' life quality and caregivers' life quality in the discussion section.

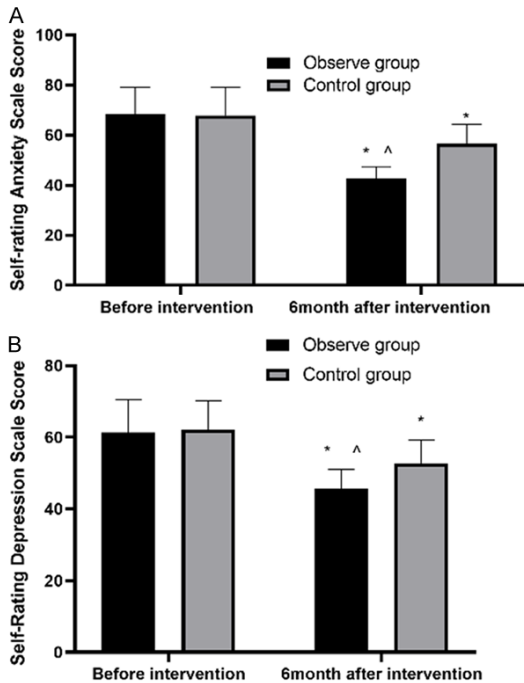
At one month after intervention, scores of the limb function and neurological function of the two patient groups all increased, and the

**Table 3.** Life quality of the two groups of patients (points)

Item	The observation group (n = 100)	The control group (n = 100)	t	P-value
Physiological function	71.84±7.78	67.84±6.35	3.98	< 0.001
Mental function	72.08±5.68	64.54±2.21	12.87	< 0.001
Social function	70.33±6.43	61.23±2.89	12.91	< 0.001
Emotional function	75.49±5.76	68.32±4.44	9.86	< 0.001

**Table 4.** Life quality of the two caregiver groups (points)

Item	The observation group (n = 100)	The control group (n = 100)	t	P-value
Physiological function	89.54±11.87	80.54±10.21	3.98	< 0.001
Mental function	87.12±13.52	78.54±7.32	11.48	< 0.001
Social function	85.46±12.65	79.23±9.32	3.97	< 0.001
Emotional function	87.78±14.21	75.66±11.67	6.59	< 0.001



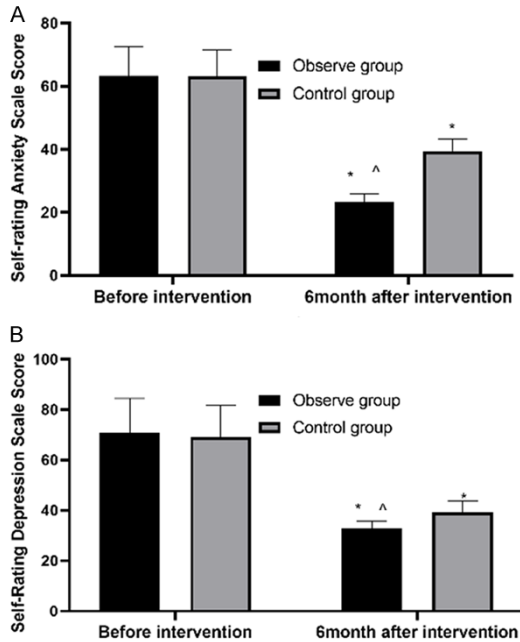
**Figure 5.** Anxiety and depression of the two patient groups. A. After 6 months of nursing, the SAS score of both patient groups decreased, and the score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ). B. After 6 months of nursing, the SDS score of both patient groups decreased, and the score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ). Note: \* indicates  $P < 0.05$  vs. the situation before treatment, and ^ indicates  $P < 0.05$  vs. the control group.

improvement in the observation group undergoing cognitive behavior intervention was better. Under the cognitive behavior intervention therapy, better control can be achieved over

the behaviors and thoughts of patients with stroke, and each patient can be cared for in every aspect [27]. Under traditional methods, these conditions are not provided, and only simple health education, dietary guidance and vital signs testing are carried out, without adequate care for each patient. Therefore, in terms of limb recovery, the recovery of patients in the control group nursed under conventional traditional methods was not as good as that in the observation group.

The limb recovery of patients is also closely related to the life quality and caregiving burden of their caregivers.

We analyzed the caregiving burden score and positive feeling score of the patients' caregivers at 3 and 6 months after intervention, finding that during this period, the caregiving burden score of both caregiver groups decreased, while the positive feeling score of them increased. Moreover, the burden score of the caregivers of patients with stroke undergoing cognitive behavior intervention was lower, and the positive feeling score of those caregivers was higher, indicating that the caregivers had less burden and more positive feelings. Because the patients will have more difficulty in moving after stroke and even cannot take care of themselves in terms of basic life, in the process of taking care of the patients, most caregivers will experience tiredness, loneliness, depression, and a decline in physical and mental health, which will further reduce the quality of caregiving, resulting in a vicious circle. Under such a situation, the work of the caregivers may be impacted, and they may suffer from insufficient sleep, chronic fatigue, and economic difficulties, which in turn will place a burden on their economic situation and even psychological pressure [28]. Under cognitive behavior intervention, the patients' caregivers are guided by medical personnel, which can improve patients' life quality. In addition, the establishment of a communication group for experience exchange and continuous improvement of nursing intervention methods are conducive to enhancing the confidence of caregivers, which is also beneficial to the recovery of



**Figure 6.** Anxiety and depression of the two caregiver groups. A. After 6 months of nursing, the SAS score of both caregiver groups decreased, and the score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ). B. After 6 months of nursing, the SDS score of both caregiver groups decreased, and the score of the observation group was significantly lower than that of the control group ( $P < 0.05$ ). Note: \* indicates  $P < 0.05$  vs. the situation before treatment, and ^ indicates  $P < 0.05$  vs. the control group.

patients. Moreover, the improvement of the patient's own condition can save more time of the caregiver on caregiving, and the amelioration of disease condition and nursing methods enhance the confidence of patients, which further intensifies the positive feelings of caregivers of the patients undergoing cognitive behavior intervention. In this way, a good virtuous circle has been formed, which gradually improves the life quality of patients and caregivers, and gradually mitigates the depression and anxiety caused by nursing and illness. It is also in line with our statistics and analysis on the life quality, depression and anxiety of patients and caregivers. The life quality score of patients undergoing cognitive behavior intervention was higher, and their SAS and SDS scores were lower [29, 30], confirming that the good virtues brought by cognitive behavior intervention has significantly improved the life quality of patients and caregivers and gradually reduced their depression and anxiety. One study on stroke has also found that cognitive

behavior intervention can mitigate the depression of patients with stroke by reducing their stress, and help them build up confidence by relieving their panic caused by anxiety and depression, so that the daily life function of patients can be better restored [31]. Wilz et al. have found that cognitive behavior intervention can mitigate the depression symptoms and physical discomfort of patients, and prolonging the intervention may enhance the curative effect [32]. However, in this study, we have not investigated nor made statistical analysis on patients' compliance with medical staff and the situation under the care of caregivers during the intervention process, and have also not investigated the satisfaction of patients, patients' families, and corresponding caregivers with this treatment and caregiving. The two aspects are indeed aspects that we can improve on in this study. In future studies, we need to observe whether patients comply with the instructions of medical staff and pay attention to their satisfaction with treatment and nursing, so as to further improve our treatment methods and nursing methods.

To sum up, cognitive behavior intervention has positive effect on patients with stroke, because it can significantly improve the life quality of patients and their caregivers, and lower the caregiving burden of the caregivers. Therefore, it is worthy of clinical promotion.

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#### Disclosure of conflict of interest

None.

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