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Retrospective Study

Correlation study between motor rehabilitation level and psychological state in patients with limb movement disorders after stroke

Xiao-Wan Li, Yu-Fu Xin, Ai-Hui Chang, Xiao-Ge Zhang, Yan Weng, Jia-Hao Yang, Qi-Zhi Fu

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Abstract

BACKGROUND

The psychological state of patients with post stroke limb movement disorders undergoes a series of changes that affect rehabilitation training and recovery of limb motor function.

AIM

To determine the correlation between motor rehabilitation and the psychological state of patients with limb movement disorders after stroke.

METHODS

Eighty patients with upper and lower limb dysfunction post stroke were retrospectively enrolled in our study. Based on Hospital Anxiety and Depression Scale (HADS) scores measured before rehabilitation, patients with HADS scores ≥ 8 were divided into the psychological group; otherwise, the patients were included in the normal group. Motor function and daily living abilities were compared between the normal and psychological groups. Correlations between the motor function and psychological status of patients, and between daily living ability and psychological status of patients were analyzed.

RESULTS

After 1, 2, and 3 wk of rehabilitation, both the Fugl-Meyer assessment and Barthel index scores improved compared to their respective baseline scores ($P < 0.05$). A greater degree of improvement was observed in the normal group compared to the psychological group ($P < 0.05$). There was a negative correlation between negative emotions and limb rehabilitation ($-0.592 \leq r \leq -0.233$, $P < 0.05$), and between negative emotions and daily living ability ($-0.395 \leq r \leq -0.199$, $P < 0.05$).

CONCLUSION

There is a strong correlation between motor rehabilitation and the psychological state of patients with post stroke limb movement disorders. The higher the negative emotions, the worse the rehabilitation effect.

Key Words: Stroke; Limb movement disorders; Motor rehabilitation; Psychological state; Correlation

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Core Tip: Stroke, also known as a cerebrovascular accident, is characterized by an acute and rapid onset and is the most common cerebrovascular disease. Stroke can cause limb dysfunction, resulting in functional limitations. Some people may experience a series of changes in their psychological state after illness, which affects rehabilitation training and recovery of limb function. The results of this study showed a strong correlation between the recovery of limb function with rehabilitation and psychological state of stroke patients. Therefore, it is necessary to pay close attention to psychological changes during rehabilitation, and implement timely adjustments and interventions for future rehabilitation.

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INTRODUCTION

Stroke can be subdivided into cerebral hemorrhage and cerebral infarction[1]. It is a clinical emergency that causes ischemic damage to the brain tissue due to the blockage or sudden rupture of small- and medium-sized blood vessels in the brain. According to the most recently published statistics, stroke ranks first as the leading cause of mortality in China, and is the main cause of accidental deaths, except for car accidents and falls from high altitudes[2]. Patients with stroke may experience swallowing and limb dysfunction, and in severe cases, they may lose their ability to take care of themselves, increasing the burden on their families and taking a serious negative toll on their mental health and resilience [3]. Therefore, it is necessary to pay close attention to psychological changes during rehabilitation, and implement timely adjustments and interventions for future rehabilitation and restoring the patient's quality of life.

The current medical disease model incorporates biological, psychological, and social factors. Medical workers should shift their treatment methods from traditional treatments to biological, psychological, and social models[4]. As the patient is anxious and worried when seeking medical treatment, the complex psychological effects can have pathogenic consequences[5]. Therefore, we should pay attention to the patients' psychological states, carefully observe their psychological reactions, and implement targeted psychological interventions based on their characteristics[6]. Related studies have shown that psychological interventions can reduce anxiety, depression, and fear in patients by reducing the heart rate, blood pressure, and catecholamine levels in blood and urine, and alleviate tension during exercise[7]. It can inhibit the activity of nociceptive neurons in the central area of the cerebral cortex, reduce their excitability, increase the pain threshold, and alleviate pain[8].

According to previous reports, there is a correlation between recovery and psychological state of the patient[9]. The better the patient's psychological state, the better will be their limb function recovery, and their quality of life will also improve accordingly[10]. This article mainly studied the correlation between the recovery of limb function owing to rehabilitation and psychological resilience in elderly stroke patients to provide a reference for psychological nursing and quality of life intervention in elderly stroke patients.

MATERIALS AND METHODS

Patient characteristics

Eighty patients with limb dysfunction after stroke who were admitted to the First Affiliated Hospital of Henan University of Science and Technology from May 2022 and May 2023 were retrospectively selected. The inclusion criteria were as follows: (1) A confirmed diagnosis of stroke on head computed tomography or magnetic resonance imaging according to

the diagnostic criteria proposed by the American Heart Association/American Stroke Association for stroke[11]; (2) The course of treatment is more than 21 d, and the condition is stable without recurrence; (3) The patient has a clear sense of autonomy and good cognitive ability; and (4) Patients with limb dysfunction after stroke. The exclusion criteria included: (1) Other serious cardiovascular and cerebrovascular diseases; (2) Patients with malignant tumors; (3) Patients with mental illness; (4) Patients with unstable vital signs; (5) Patients with previous stroke but residual upper and lower limb dysfunction and other sequelae; and (6) Patients with a history of surgery, fractures, arthritis, or pain that affects the recovery of upper and lower limb function. Based on the Hospital Anxiety and Depression Scale (HADS) scores before the start of rehabilitation, the patients were divided into the psychological group (those with HADS scores ≥ 8) and the normal group (those with HADS scores < 8).

Evaluation indices

The HADS index was used to evaluate the psychological state of patients[12]. This is a 14-item scale with seven items rated as anxiety and seven items rated as depression. If the HADS score is ≥ 8 , it indicates symptoms of anxiety and depression. If the HADS score is < 8 , the patient's psychological state is considered normal.

The Fugl-Meyer assessment (FMA) was used to evaluate the patient's upper and lower limb motor function[13]. There were 50 items with a total maximum score of 100 points. The upper limb score consists of 33 items and 66 points. The lower upper limb score consists of 17 items and with a total of 34 points.

The Barthel index (BI) for activities of daily living[14] was used to assess the patients' daily living abilities. The BI includes 10 items, with a total of 100 points. Except for walking on flat ground and bed-to-chair transfer, the full score was 15 points, whereas the full score for grooming and bathing was 5 points. The remaining items had a total score of 10 points.

Statistical analysis

SPSS 20.0 was used to statistically analyze the data. The measurement data were represented by (mean \pm SD), and the *t*-test was used for intergroup comparisons. The counting data is represented in the form of percentage, and χ^2 is used for the intergroup comparisons. Pearson's correlation analysis was used to analyze the relationship between the rehabilitation of limb function and the psychological status of patients as well as the relationship between daily living ability and psychological status. Statistical significance was set at $P < 0.05$.

RESULTS

The comparison of general data

As shown in Table 1, there were no differences between gender (male, 60% vs 62.5%), age (65.33 \pm 4.59 vs 65.90 \pm 4.91), body mass index (25.43 \pm 2.08 vs 25.86 \pm 1.74), and course of disease (27.93 \pm 7.11 vs 27.83 \pm 7.88) between the normal and psychological groups ($P > 0.05$). The results showed that most stroke patients with motor disorders were classified as elderly and the duration of the disease was between 1 and 2 mo.

The comparison of motor function between normal and psychological groups

As shown in Figures 1A and B, there was no difference in the FMA scores of the upper and lower limbs between the normal and psychological groups ($P > 0.05$). After 1, 2, and 3 wk of rehabilitation, the FMA scores of the upper and lower limbs improved in both groups ($P < 0.05$). In addition, the FMA scores of the upper and lower limbs in the normal group had more substantial improvement than those in the psychological group ($P < 0.05$).

The comparison of daily living ability between the normal and psychological group

Figure 1C shows that before rehabilitation, there was no difference in the BI scores between the normal and psychological groups ($P > 0.05$). After 1, 2, and 3 wk of rehabilitation, the BI score improved in both groups ($P < 0.05$), and the BI score in the normal group was higher than that in the psychological group ($P < 0.05$).

The correlation between negative emotions and limb rehabilitation

As shown in Table 2, there was a negative correlation between anxiety and upper, lower limb FMA scores at 1-, 2- and 3-wk post rehabilitation ($P < 0.05$). There was a negative correlation between depression and upper, lower limb FMA scores at 1-, 2- and 3-wk post rehabilitation ($P < 0.05$). These results suggested a negative correlation between negative emotions and limb rehabilitation.

The correlation between negative emotions and daily living ability

There was a negative correlation between anxiety and BI scores at 2- and 3-wk post rehabilitation ($P < 0.05$), and there was a negative correlation between depression and BI scores at 1-, 2- and 3-wk post rehabilitation ($P < 0.05$) (Table 3). These results suggest a negative correlation between negative emotions and activities of daily living.

Table 1 The comparison of general data between normal and psychological groups

Index	Normal group (n = 40)	Psychological group (n = 40)	t/ χ^2	P value
Gender (male, %)	24 (60%)	25 (62.5%)	-0.053	0.818
Age (yr)	65.33 ± 4.59	65.90 ± 4.91	-0.541	0.590
BMI (kg/m ²)	25.43 ± 2.08	25.86 ± 1.74	-0.997	0.322
Course of disease (d)	27.93 ± 7.11	27.83 ± 7.88	0.060	0.953

BMI: Body mass index.

Table 2 The correlation between emotions and limb rehabilitation

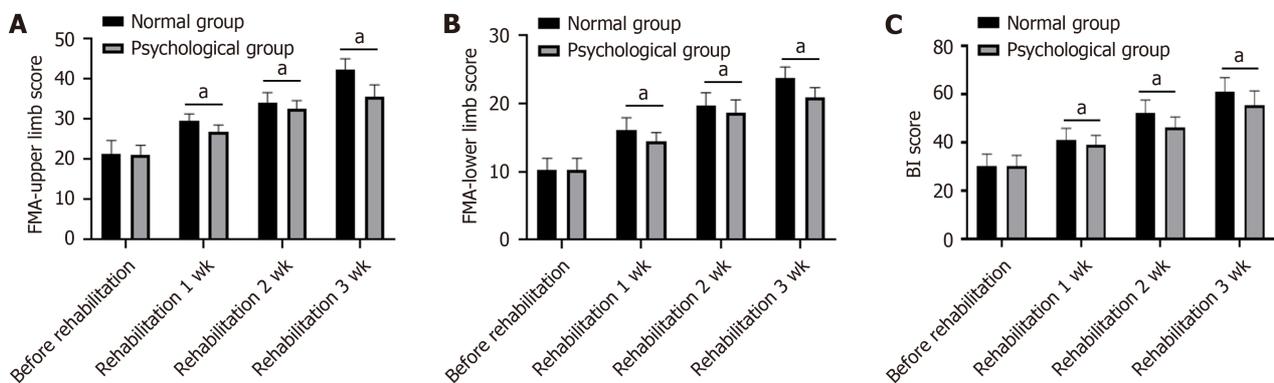
	FMA score of upper limb			FMA score of lower limb		
	1 wk	2 wk	3 wk	1 wk	2 wk	3 wk
Anxiety	<i>r</i> = -0.341 <i>P</i> = 0.005	<i>r</i> = -0.339 <i>P</i> = 0.002	<i>r</i> = -0.592 <i>P</i> < 0.001	<i>r</i> = -0.288 <i>P</i> = 0.010	<i>r</i> = -0.289 <i>P</i> = 0.009	<i>r</i> = -0.454 <i>P</i> < 0.001
Depression	<i>r</i> = -0.319 <i>P</i> = 0.012	<i>r</i> = -0.233 <i>P</i> = 0.038	<i>r</i> = -0.585 <i>P</i> < 0.001	<i>r</i> = -0.369 <i>P</i> = 0.001	<i>r</i> = -0.255 <i>P</i> = 0.023	<i>r</i> = -0.475 <i>P</i> < 0.001

FMA: Fugl-Meyer assessment.

Table 3 The correlation between emotions and daily living ability

	BI score		
	1 wk	2 wk	3 wk
Anxiety	<i>r</i> = -0.199 <i>P</i> = 0.077	<i>r</i> = -0.377 <i>P</i> = 0.001	<i>r</i> = -0.395 <i>P</i> < 0.001
Depression	<i>r</i> = -0.233 <i>P</i> = 0.038	<i>r</i> = -0.379 <i>P</i> = 0.001	<i>r</i> = -0.387 <i>P</i> < 0.001

BI: Barthel index.



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Figure 1 The comparison of motor function and daily living ability between normal and psychological groups. A: Fugl-Meyer assessment (FMA)-upper limb score; B: FMA-lower limb score; C: Daily living ability. FMA: Fugl-Meyer assessment. BI: Barthel index. **P* < 0.05.

DISCUSSION

The incidence of cerebrovascular diseases and stroke, which is the most common type of cerebrovascular disease[15], has increased annually, and they generally occur in the younger and middle-aged group[16]. Once affected by stroke, patients with mild disease may experience delayed movement, whereas those with severe disease phenotypes may experience limb dysfunction and even death. Some people may experience a series of changes in their psychological state after illness, which affects rehabilitation training and recovery of limb function[17]. Elderly people have decreased bodily functions, more comorbidities, and a strong psychological dependence on their families[18]. After a period of illness, they not only have to endure the torment of illness but also the inconveniences of life. These patients bear significant psychological pressure as a result.

Many patients find it difficult to complete role conversion in a short time; the rehabilitation training initiative is poor, the effect is not obvious, depression and pessimism appear, psychological resilience becomes affected, and it is easily complicated with acute stress disorder; that is, some separation symptoms, such as mental, movement, and personality dysfunction appear in the early stages of the illness[19]. Those with avoidance and high vigilance towards illness events deliberately avoid the facts about one's own illness, suspect the gaze of others, are unable to control one's emotions and temper, and are prone to irritability, anger, and poor sleep quality[20].

This study used the HADS to evaluate the psychological status of patients with limb movement disorders after stroke and to determine whether they had anxiety and depression before rehabilitation initiation. In previous studies that followed-up stroke patients, it was hypothesized that fear of pain affects post-stroke functional recovery; however, there was no correlation between the two[21]. It is recommended that patients pay attention to their fears and receive reasonable psychological interventions. Related studies suggest that anxiety and depression affect the recovery of limb function in stroke patients[22]. Our study showed that the motor function and daily living ability of stroke patients in the psychological group were lower than those in the normal group after 1-, 2-, and 3-wk of rehabilitation, indicating that anxiety and depression negatively impact the recovery of motor function and daily living ability. Further, our research showed a significant negative correlation between negative emotions such as anxiety and depression, motor function, and self-life ability. This was because patients in the psychological group had a poor psychological state and lacked the ability to withstand stress[23]. They are unable to establish a good buffer time after the illness, which is not conducive to the creation of positive emotions and is even less conducive to the recovery of upper and lower limb function after stroke[24].

Therefore, we should attach importance to the psychological state of patients before rehabilitation, and it is recommended that future studies address the following points to achieve better outcomes: Firstly, rehabilitation plans should be developed to improve patients' quality of life, take effective psychological intervention measures, and observe and evaluate the actual effects. This may be done by equipping dedicated psychologists with the correct resources to strengthen research on the psychological status of stroke patients before rehabilitation. Secondly, optimal treatment methods should be adopted to reduce and eliminate the adverse effects of psychological factors on limb motor function before rehabilitation. Furthermore, attention should be paid to the psychological rehabilitation of patients after discharge and to strengthen follow-up procedures. Finally, the active cooperation between psychologists and rehabilitation physicians must be strengthened to minimize negative psychological impacts.

Our study has several limitations. There are many factors that affect the recovery of limb motor function, and psychological factors are only one of them. This study only considered the effects of anxiety and depression on limb motor function recovery before rehabilitation. Further research is needed to investigate the effects of other factors on recovery of limb motor function. The evaluation of various indices in this study are mostly in the form of a subjective numeric rating scale. At the same time, due to differences in language expression and understanding among ethnic minorities, there may have been errors in the measurement of each indicator. In the future, more objective indicators such as imaging findings should be used to quantify the results more accurately. This study only examined the impact of psychological factors before rehabilitation on limb motor function rehabilitation, without considering the impact of psychological factors, and it did not consider effective psychological intervention measures for adverse psychological outcomes. This must be investigated in the future. Finally, sample size of this study was small, and future multi-center studies with larger sample sizes are needed to confirm this finding.

CONCLUSION

In summary, there is a certain correlation between the psychological state of patients with limb disorders after stroke and their level of limb rehabilitation; the greater the negative emotions, the worse the rehabilitation effect. In clinical practice, healthcare workers can assist in the rehabilitation of patients' limb functions by improving their psychological state, indirectly improving their quality of life.

ARTICLE HIGHLIGHTS

Research background

The rehabilitation of limb function in patients with limb movement disorders after stroke is influenced by their psychological state.

Research motivation

Exploring whether healthcare workers can accelerate the recovery of limb function in stroke patients by improving their psychological state and indirectly improving their quality of life.

Research objectives

The aim of this study was to investigate the correlation between the level of motor rehabilitation and the psychological state of patients with limb movement disorders post stroke.

Research methods

Eighty patients with limb dysfunction after stroke were retrospectively selected. The Fugl-Meyer assessment motor function and Barthel index daily living ability scales were used to investigate limb movement disorders and daily living ability, and a correlation between the two indices and psychological state was observed.

Research results

There was a negative correlation between negative emotions and limb rehabilitation and between negative emotions and daily living ability.

Research conclusions

The better the psychological state of patients with limb movement disorders after stroke, the more significant the rehabilitation effect on limb function recovery.

Research perspectives

When performing limb function rehabilitation in patients with limb movement disorders after stroke, it is necessary to pay attention to the patient's psychological state. A good psychological state can accelerate recovery.

FOOTNOTES

Author contributions: Li XW designed the study and wrote the paper; Fu QZ designed the study and supervised the report; Xin YF organized and analyzed the data; Zhang XG and Weng Y provided clinical advice; Chang AH and Yang JH organized the references.

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