

Original Article

The effects of limb functional exercises combined with Chinese medicine acupoint massage on the gastrointestinal and immune functions of elderly bedridden patients

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Abstract: Objective: This study aimed to explore the effect of limb functional exercises combined with Chinese medicine acupoint massage on the gastrointestinal and immune functions of elderly bedridden patients. Methods: A prospective randomized controlled study was conducted to compare the effects of "limb functional exercise" (control group, n=50) and "Chinese medicine acupoint massage combined with limb functional exercises" (observation group, n=50) on the rehabilitation of elderly bedridden patients. The immune function index, gastrointestinal symptom score, quality of life score, perioperative stress injury, patient satisfaction, and the incidence of adverse reactions after the intervention were observed and recorded in the two groups of patients before and after the intervention. Results: There was no significant difference in the incidence of stress injuries and adverse reactions between the two groups during the perioperative period ($P>0.05$). The satisfaction of patients in the observation group was significantly higher than it was in the control group ($P<0.05$). After the treatment, the CD4+, CD8+, CD4+/CD8+, IgA, and IgG levels in the observation group were significantly improved compared with the pre-treatment levels ($P<0.05$). The CD4+, CD4+/CD8+, IgA, and IgG levels in the control group were also significantly improved compared with those in the control group ($P<0.05$), but the CD4+, CD8+, CD4+/CD8+, IgA and IgG levels in the control group were not significantly improved before or after the treatment ($P>0.05$). The gastrointestinal symptom scores after the treatment in both groups were significantly reduced ($P<0.0001$), and the SF-36 scale and Fugl-Meyer Assessment Scale (FMA) scale scores were significantly increased compared with the pre-treatment scores ($P<0.0001$, $P<0.001$). Compared with the control group, the gastrointestinal symptom scores of the patients in the observation group decreased more significantly after the treatment ($P<0.0001$), and the SF-36 scale scores increased more significantly ($P<0.001$). There was no significant difference in the FMA scores between the observation group and the control group ($P>0.05$). Conclusion: Limb functional exercises combined with Chinese medicine acupoint massage can significantly improve gastrointestinal function, nursing satisfaction, and the quality of life of elderly bedridden patients during hospitalization, and can significantly improve the patients' immune function. The immune function improvement may be related to the gastrointestinal function improvement.

Keywords: Elderly bedridden patients, physical functional exercises, Chinese medicine acupoint massage, gastrointestinal function, immune function

Introduction

Asian countries with high population densities, such as China and Japan, have an increasing aging population. The investigation of the spatial and temporal variations of China's population aging predicts that the number of elderly people aged 60 and over will reach 300 million by 2025, accounting for about 20% of the total

population. By 2033, the elderly population will exceed 400 million, accounting for about 25% of the total population. By 2050 the elderly population will reach 487 million, accounting for about one third of the total population [1, 2]. Due to the decline of body function, the elderly have less tolerance to diseases, especially bedridden elderly patients [3, 4]. In addition to the threat basic diseases bring to a patient's health,

elderly bedridden patients lose opportunities for exercise due to long-term bed rest, resulting in additional risks, so stress injuries, gastrointestinal dysfunction, and immune hypofunction are common problems faced by elderly bedridden patients [5]. So, it is of clinical value to study the prevention strategies of complications during bed rest for elderly bedridden patients.

With the continuous development of the world's medical knowledge, Chinese medicine treatment represented by acupoint massage is playing an increasingly important role in the medical system [6]. Meridian is a channel that runs qi and blood, connects Zang-Fu organs, the body surface and all passageways of the body, and it is a control system for the functions of various organs and tissues of the human body. Acupoints are special parts on the meridian line of the human body. Massage stimulation can effectively recover patients' corresponding functions and has a certain functional significance in the operation of organ functions [7, 8]. The study of Choi significantly improves hand grip strength and the quality of life of stroke patients with hemiplegia after hand massages [9]. Ruan et al. showed that acupoint massage can accelerate the recovery of gastrointestinal function after gynecological laparoscopy by regulating the release of gastrointestinal hormones [10]. Research by Linhares et al. showed that early limb functional exercise can improve the immune function of bedridden patients in obstetrics and gynecology and shorten the hospitalization time [11]. Li believes that limb functional exercises for bedridden patients with post-stroke paralysis can effectively reduce complications while the patients are bedridden, such as stress injuries, and the satisfaction levels of hospitalized patients are higher [12].

This research innovatively applied limb functional exercises combined with Chinese medicine acupoint massage to carry out rehabilitation nursing for bedridden elderly patients in an internal medicine department and compared the effect of limb functional exercises combined with Chinese medicine acupoint massage with previous single limb functional exercises, thus verifying the superiority and safety of limb functional exercises combined with Chinese medicine acupoint massage.

Data and methods

General information

According to the inclusion and exclusion criteria, bedridden elderly patients with internal disease in Sichuan Provincial People's Hospital from December 2017 to July 2019 were prospectively screened. Inclusion criteria: ① The study met the latest WHO definition standard for the elderly (≥ 60 years old) [13]; ② The patients needed to stay in bed for treatment due to diseases; ③ The patients had no pressure injuries before their admission; ④ The patients had a clear consciousness, and the condition of their primary disease was stable. Exclusion criteria: ① Patients with advanced malignant tumors and a life expectancy of less than 6 months; ② Patients also suffering from gastrointestinal diseases that affect the observation of their gastrointestinal function, such as gastric cancer, gastritis, and functional gastroenteropathy; ③ Patients with pressure injuries; ④ Patients with mental disorders who could not cooperate with the rehabilitation nursing. A total of 100 eligible elderly bedridden patients were included.

This study was approved by the Medical Ethics Committee of the Sichuan Academy of Medical Sciences, Sichuan Provincial People's Hospital, and all the patients signed informed consent forms.

Method

The patients were randomly divided into an observation group and a control group. The patients signed the informed consent form after a routine declaration, and the patients who did not agree to participate in the study were excluded. All the patients were given limb functional exercises during their hospitalization, and the control group had no other rehabilitation nursing measures other than this, and the observation group applied TCM acupoint massage in addition to the limb functional exercises. The detailed steps of the Chinese medicine acupoint massage and the limb functional exercises were as follows:

(1) Acupoint massage [9, 10]: The massage was carried out according to the steps of toe \rightarrow foot center \rightarrow heel \rightarrow ankle, and the basic reflex zone, the direct reflex zone and the rele-

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vant reflex zone of the pelma were defined. The basic reflex zone corresponded to the urinary system, the direct reflex zone to the digestive system, and the relevant reflex zone to the nervous system. The massage was carried out using various methods, including thumb pushing, forefinger scraping, and palm kneading. The massage process needed to be carried out slowly, with 36 massages in each reflection area and 30 minutes of comprehensive massage time. Then the thumb was pressed 10 times according to the path of spleen meridian of the foot Taiyin (big toe → medial middle edge of lower limb → third lateral line of chest and abdomen), and the comprehensive massage time was 10 minutes.

(2) Limb function exercises [11, 12]: The patient was assisted to lie in a supine position and perform functional exercises in the order of shoulder joint → elbow joint → wrist joint → knuckle joint → hip joint → knee joint → ankle joint → toe joint. Shoulder joint: with the help of medical staff, the elbows were stretched out into an abduction and rotation state, and then the elbows were lifted up slightly for 3 seconds, and the actions were repeated 10 times before changing to the opposite side. Elbow joint: The patients with an upper limb autonomous movement ability were guided to bend and stretch the elbows of both arms, and each arm was repeated 10 times. Patients with poor physical foundations and no autonomous movement ability were assisted in the same exercise. Wrist joint: with the assistance of the medical staff, the patients grasped their wrists and palms, bent and stretched slightly with force, 15 times for each wrist, and both sides went from left to right. Finger joint: the medical staff guided the patient to do the movement of clenching and straightening, and gently kneading the finger after the knuckles of each hand did the above movements 15 times. The patients who had no fist-gripping ability were assisted with this exercise, and the two sides were carried out in turn from left to right. Hip joint: The patient was assisted to straighten and close the legs. The medical staff held the ankles of both feet and lifted the patient's feet slightly with force, and the slowly lowered them after holding them up for 3 seconds. The movement was gentle and slow. After 10 repetitions of the hip joint flexion, the hip joint was extended, and the patient was instructed to control the pelvis slightly to maintain it above a horizontal state. For patients with insufficient waist strength, the medical

staff assisted them to do the above exercise, and the assisting staff were slow and gentle, and the above steps were repeated 10 times. Knee joint: The medical staff held the ankle and knee, and then instructed the patient to do flexion and extension movements and provided resistance to the movements, for a total of 15 times. Ankle joint: The medical personnel held the heel and toe with both hands, rotated the ankle joint in and out in sequence, and maintained the state for 3 seconds after the ankle joint rotated to the maximum angle, for a total of 15 times, with both sides in turn. Toe joint: The lower limbs were naturally straightened, and the medical staff pressed the heel with one hand and the upper part of the sole with the other hand to do the varus and valgus movements to the maximum angle and then maintained the state for 3 seconds. This was repeated 15 times, with both sides in turn.

Outcome measures

① Occurrence of pressure injuries in the two groups of patients during the perioperative period: according to the 2007 NPUAP ulcer staging of the USA [14], the degree of pressure injuries of the patients was divided into suspected deep tissue injury stage, stage I, stage II, stage III, stage IV, and non-staging. The total incidence rate = (number of suspected deep tissue injury stage + number of patients in stage I + number of patients in stage II + number of patients in stage III + number of patients in stage IV and the number of patients in non-staging)/total number of patients * 100%.

② Incidence of adverse reactions in the two groups of patients during the perioperative period [15]: The occurrence of common complications during hospitalization was observed, including bedsores, constipation/abdominal distension, muscle contracture, urinary system infections, hypostatic pneumonia, and deep vein thrombosis.

③ The nursing satisfaction of the two groups of patients: according to the self-made nursing satisfaction survey scale of our hospital, the patients' nursing satisfaction was evaluated independently. The scale divided nursing satisfaction into very satisfactory, satisfactory, general, unsatisfactory, and very unsatisfactory. Nursing satisfaction = (number of very satisfactory cases + number of satisfactory cases)/total number of cases] * 100%.

④ Immune function before and after the treatment in both groups [16, 17]: The level of cellular immune function (CD4+, CD8+, CD4+/CD8+) and humoral immune function (IgA, IgG) were examined before and after the treatment. The cellular immune indexes were analyzed using the Navios flow cytometric analysis system (Beckman Coulter, USA), and the humoral immune indexes were analyzed using the Uni-Cel Dxl 800 immune analysis system (Beckman Coulter, USA).

⑤ Gastrointestinal symptom scores before and after treatment in the two groups of patients [18]: The gastrointestinal symptom rating scale (GSRS) was used to evaluate the gastrointestinal function of the patients before and after the treatment. The main evaluation indexes included defecation difficulty, stool shape, defecation time, falling and distending sensation, defecation frequency, and abdominal distension. The indexes were divided according to the severity of the symptoms of the patients, with 0 the lowest and 3 the highest. The combined scores of the 6 indexes were used to calculate each patient's GSRS score.

⑥ Quality of life before and after the treatment in two groups of patients [19]: The quality of life of the disabled elderly was evaluated using the MOS item short form health survey (SF-36), which was developed by Boston Health Research Institute in the United States and was tested for reliability and validity in China, and was suitable for the elderly population.

⑦ Limb motor function level before and after the treatment [12]: The limb function was quantitatively evaluated using the Fugl-Meyer Assessment Scale (FMA). The highest possible score of each item was 2 points, with 66 points for 33 components of the upper limbs and hands, 34 points for the 17 components of the lower limbs, for a total of 100 points for the upper and lower limbs. A high score was indicated better limb motor function.

Statistical methods

SPSS 24.0 (SPSS Inc. Chicago, IL, USA) was used for the data analysis. The incidence of stress injuries, the incidence of adverse reactions in the perioperative period, the nursing satisfaction, and the other count data were expressed as cases (percentage, n, %). The theoretical number ($T \geq 5$) and the total sample size ($n \geq 40$) were tested using Pearson χ^2 tests.

The theoretical number ($T < 5$ but $T \geq 1$ and $n \geq 40$) were tested using χ^2 tests with continuity corrections. The theoretical number ($T < 1$ or $n < 40$) applied Fisher's test. Mann-Whitney U tests were used for the inter-group comparisons of the grade data such as the NPUAP ulcer staging. Measurement data such as the immune function index, the gastrointestinal symptoms scores and the SF-36 scale scores were expressed as the mean \pm standard deviation ($\bar{x} \pm sd$). Independent sample t tests were performed for the comparison between groups, and paired sample t tests were performed for comparisons within a group. Both sides $\alpha = 0.05$ were selected for the test level, and $P < 0.05$ was considered a significant difference.

Results

Baseline data

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

The incidence rate of pressure injuries of elderly bedridden patients combined with Chinese medicine acupoint massage did not significantly decrease during the perioperative period of treatment

There was no significant difference in the incidence rate of pressure injuries between the observation group and the control group (6.00% vs 8.00%, $P = 0.695$) (**Table 2**). Neither of the two groups had stage IV and therefore could not be staged.

The incidence of adverse reactions in the perioperative period of elderly bedridden patients combined with Chinese medicine acupoint massage did not significantly decrease

There was no significant difference in the incidence of adverse reactions between the two groups (8.00% vs 12.00%, $P = 0.505$) (**Table 3**).

Limb function exercises combined with Chinese medicine acupoint massage significantly improved the satisfaction of elderly bedridden patients

The satisfaction in the observation group was significantly higher than it was in the control group (100.00% vs 86.00%, $P < 0.05$) (**Table 4**).

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Table 1. Comparison of the baseline data between the two groups of patients (n, %, $\bar{x} \pm s$)

Project	Observation group (n=50)	Control group (n=50)	χ^2/t	P
Age (years)	70.1±8.4	71.3±9.5	0.669	0.505
Gender (male/female, n)	23 (46.00)/27 (54.00)	29 (58.00)/21 (42.00)	0.038	0.845
BMI (kg/m ²)	20.82±2.23	21.12±2.54	0.628	0.532
Braden pressure ulcer score (points)	12.14±1.97	12.42±1.90	0.723	0.471
Main cause for being bedridden (n)				
Malignant tumor	4 (8.00)	6 (12.00)	0.444	0.505
Cerebral infarction	10 (20.00)	11 (22.00)	0.060	0.806
Cerebral hemorrhage	7 (14.00)	8 (16.00)	0.078	0.779
Alzheimer's disease	3 (6.00)	4 (8.00)	0.154	0.695
Senile dysfunction	12 (24.00)	10 (20.00)	0.233	0.629
Chronic obstructive pulmonary disease	6 (12.00)	7 (14.00)	0.088	0.766
Senile osteoarthritis	5 (10.00)	3 (6.00)	0.543	0.461
Other	3 (6.00)	1 (2.00)	1.041	0.307

Note: BMI: body mass index.

Table 2. Comparison of the incidence of stress injuries during the treatment period between the two groups of patients (n, %)

Project	Control group (n=50)	Observation group (n=50)	U	P
Suspicious deep tissue damage	0 (0.00)	1 (2.00)	-0.653	0.695
I Stage	1 (2.00)	1 (2.00)		
II Stage	2 (4.00)	1 (2.00)		
III Stage	1 (2.00)	0 (0.00)		

Table 3. Comparison of the incidence of adverse reactions during the treatment period between the two groups of patients (n, %)

Project	Control group (n=50)	Observation group (n=50)	χ^2/F	P
Decubitus	3	1	1.042	0.307
Constipation/bloating	1	2	0.000	1.000
Muscle contracture	1	1	0.000	1.000
Urinary system infection	1	0	0.000	1.000
Total incidence	12.00%	8.00%	0.444	0.505

Table 4. Comparison of the patient satisfaction between two groups (n, %)

Project	Control group (n=50)	Observation group (n=50)	χ^2	P
Very satisfied	21	32	-	-
Satisfaction	14	18	-	-
General	8	0	-	-
Dissatisfied	5	0	-	-
Very dissatisfied	2	0	-	-
Total satisfaction	86.00%	100.00%	5.316	0.021

Limb function exercises combined with Chinese medicine acupoint massage improved the immune function of elderly bedridden patients more significantly

The CD4+, CD8+, CD4+/CD8+, IgA, and IgG levels in the observation group after the treatment were significantly improved compared with the levels before the treatment (48.37±5.58 vs 34.33±9.28, P<0.05; 34.57±4.98 vs 31.71±4.39, P<0.05; 1.46±0.21 vs 1.31±0.18, P<0.05; 146.49±13.93 vs 130.03±14.85, P<0.05; 125.46±20.21 vs 106.84±20.70, P<0.05). The CD4+, CD8+, CD4+/CD8+, IgA, and IgG levels in the control group were not significantly improved before or after the treatment (P>0.05). The CD4+, CD8+, CD4+/CD8+, IgA, and IgG levels in the two groups showed no significant differences before

Table 5. Comparison of the immune function between two groups of patients before and after the treatment ($\bar{x} \pm s$)

Project	Control group (n=50)		Observation group (n=50)	
	Before treatment	After treatment	Before treatment	After treatment
CD4+ (%)	33.52±9.53	35.72±7.26	34.33±9.28	48.37±5.58*. [#]
CD8+ (%)	32.85±3.37	33.30±4.63	31.71±4.39	34.57±4.98*
CD4+/CD8+	1.29±0.27	1.34±0.29	1.31±0.18	1.46±0.21*. [#]
IgA (U/mL)	100.48±14.77	105.22±15.88	130.03±14.85	146.49±13.93*. [#]
IgG (U/mL)	104.77±18.68	111.71±19.28	106.84±20.70	125.46±20.21*. [#]

Note: *compared with before the treatment, [#]compared with after the treatment, P<0.05.

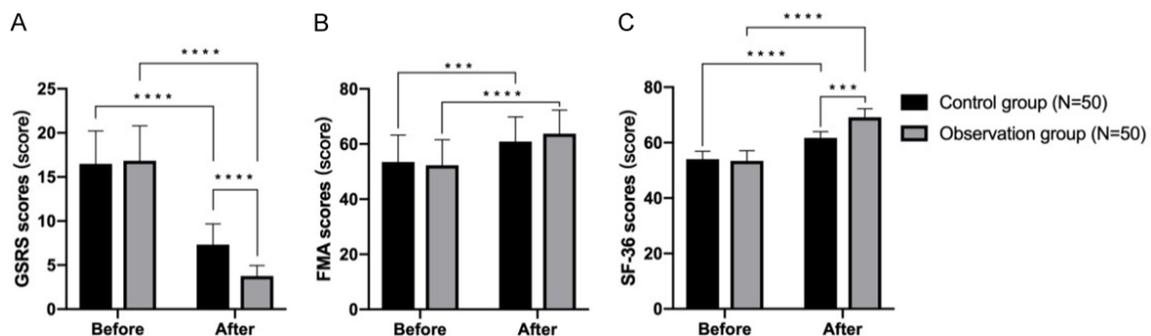


Figure 1. Changes in the GRS, FMA, and SF-36 scale scores before and after treatment in the two groups of patients. A. GRS scores before and after the treatment in both groups; B. FMA scores before and after the treatment in both groups; C. SF-36 scores before and after the treatment in both groups. ***indicates P<0.001, ****indicates P<0.0001; GRS: Gastrointestinal symptom rating scale; FMA: Fugl-Meyer Assessment Scale.

the treatment (P>0.05). After the treatment, the CD4+, CD4+/CD8+, IgA, and IgG levels in the observation group were significantly higher than they were in the control group (48.37±5.58 vs 35.72±7.26, P<0.05; 1.46±0.21 vs 1.34±0.29, P<0.05; 146.49±13.93 vs 105.22±15.88, P<0.05; 125.46±20.21 vs 111.71±19.28, P<0.05) (Table 5).

Limb function exercises combined with Chinese medicine acupoint massage had a more significant improvement on the gastrointestinal function, limb function, and quality of life of elderly bedridden patients

The gastrointestinal symptom scores in the observation and the control groups after the treatment were significantly reduced compared with the pre-treatment scores (3.76±1.19 vs 16.85±3.96, P<0.0001; 7.32±2.35 vs 16.49±3.72, P<0.0001). Compared with the control group, the gastrointestinal symptom scores of the patients in the observation group showed no significant differences before the treatment (16.85±3.96 vs 16.49±3.72, P=0.641). The ga-

strointestinal symptom scores of the patients in the observation group decreased more significantly after the treatment (3.76±1.19 vs 7.32±2.35, P<0.0001) (Figure 1A).

The FMA scores of the two groups after the treatment were significantly increased compared with the scores before the treatment (52.33±9.22 vs 63.74±8.58, P<0.0001; 53.48±9.73 vs 60.92±8.93, P<0.001). Compared with the control group, the FMA scores of the patients in the observation group showed no significant differences before the treatment (52.33±9.22 vs 53.48±9.73, P=0.546), and the FMA scores of the patients in the observation group showed no significant differences after the treatment (63.74±8.58 vs 60.92±8.93, P=0.111) (Figure 1B).

The SF-36 scores of the patients in the observation and the control groups increased significantly after the treatment compared with the scores before the treatment (69.15±3.07 vs 53.42±3.67, P<0.0001; 61.71±2.24 vs 54.02±2.89, P<0.0001). Compared with the

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control group, the SF-36 scale scores of the patients in the observation group showed no significant differences before the treatment (53.42 ± 3.67 vs 54.02 ± 2.89 , $P=0.366$). The SF-36 scale scores of the patients in the observation group increased more significantly after the treatment (69.15 ± 3.07 vs 61.71 ± 2.24 , $P < 0.001$) (Figure 1C).

Discussion

Chinese medicine and western medicine are two different medical systems. With the continuous improvement of the world's medical system, Chinese medicine and western medicine have gradually changed from the previous opposition to coexistence, and the integration of traditional and western medicine has become a new treatment strategy [20, 21]. Limb functional exercises are a rehabilitation concept from western medicine. Acupoint massage is a rehabilitation concept from traditional Chinese medicine, and the application of the integration of traditional and western medicine in the field of rehabilitation nursing needs to be studied urgently.

The results of this study confirmed that limb functional exercises combined with Chinese medicine acupoint massage can significantly improve gastrointestinal function, limb movement function, the quality of life, and the improvement of the immune function index, gastrointestinal function, and the quality of life index of patients with combined rehabilitation is significantly better than that of patients with simple limb function exercises. Research by Lee et al. showed that massage rehabilitation can improve and regulate the functions of various organs and tissues of the body through standardized and rhythmical skills on the meridian points or the special parts of the human body using professional techniques [22]. Different meridians and different acupuncture points on the same meridian correspond to different functions of the human body. Research by Ruan et al. showed that acupuncture point massage can effectively promote the gastrointestinal function recovery of patients undergoing gynecological laparoscopic surgery [23]. This research found that the intestinal sound recovery time, the first anal urination time, and the first defecation time of the acupuncture point massage group were significant-

ly shortened than in the traditional nursing mode group, and the acceleration of intestinal function recovery after gynecological laparoscopic surgery by acupuncture point massage may be accomplished by adjusting the release of gastrointestinal hormones. Tao et al. conducted a randomized controlled study on 90 patients with advanced lung cancer [24]. The observation group received massage intervention at specific acupuncture points, and the control group received massage intervention at non-specific acupuncture points. Two weeks after the massage intervention, the adverse oral reaction rate, the nausea rate, the vomiting rate, and the diarrhea rate in the observation group were 71.11%, 80.0% and 84.44%, rates significantly lower than those in the normal control group. The results of this study showed that acupoint massage can reduce gastrointestinal adverse reactions caused by chemotherapy in patients with advanced lung cancer. Acupoints are special functional parts of human meridians, and different acupoints have different regulatory effects on organ and tissue functions. Acupoint massage in this study was mainly aimed at the feet, lower legs, and abdomen, and its main function was to regulate and improve gastrointestinal function. In modern western medicine theory, the gastrointestinal tract has a mucosal immune function, and the immune function of the human body is related to gastrointestinal tract function. Good immune function is a good guarantee of gastrointestinal tract function. Patino et al. showed that chronic aerobic exercise can improve the immune function of patients by regulating the T cell proliferation response [25]. Joisten et al. showed that therapeutic exercise can regulate inflammatory immune signal transmission in patients with multiple sclerosis and is conducive to the rehabilitation of cognitive function [26]. A multicenter study conducted by Courvoisier et al. compared the prevalence rate of ulcers in 51 eligible sanatoriums (3,824 patients) in Geneva, Switzerland, and found that the overall prevalence rate of the hospitalized elderly patients was 5.7%, but the difference was very large, ranging from 0% to 19.6% [27]. Limb functional exercise can effectively prevent the occurrence of ulcers, but the process of limb function exercises is not ideal.

The recovery effect of Chinese medicine acupoint massage on the gastrointestinal func-

tions of patients and the effect of limb functional Chinese medicine acupoint massage exercises on ulcer prevention and immunity improvement in this study have been confirmed by previous clinical evidence, but the effect of the combined application of the two is still unexplored. In our study, the elderly bedridden patients who underwent limb functional exercises combined with Chinese medicine acupoint massage showed a better rehabilitation nursing effect. Although both groups of patients maintained a lower incidence of stress injuries and adverse reactions during the perioperative period, the nursing satisfaction and quality of life scores of the patients with the combined rehabilitation were effectively improved compared with single limb function exercises. The improvement of nursing satisfaction and the quality of life scores might be related to the improvement of the patients' gastrointestinal functions. This is consistent with the research results of Ruan, Tao et al. [10, 23]. The study further observed the gastrointestinal and immune functions of the patients. The results showed that the patients who had rehabilitation care showed better cellular immunity and humoral immunity levels, and the patients' gastrointestinal symptom scores improved more significantly. The research results of Patino, Joisten et al. explained the improvement of the cellular immunity level of the patients in the observation group of this study well [24-26], while the IgA and IgG levels reflected the patients' mucosal immunity and humoral immunity levels [27, 28]. Particularly, IgA can most directly reflect the mucosal immunity level of the patients. This result also showed that the improvement of the immune function of the patients by limb functional exercises combined with Chinese medicine acupoint massage is comprehensive, and not only limited to cellular immunity. But the data in this study are few, and this conclusion still needs to be verified by further expanding the sample size. In this study, all the patients in the observation group received gastrointestinal acupoint massage, and their gastrointestinal symptom scores were significantly different from those in the control group, which may be due to the improvement of the gastrointestinal function and the improvement of the digestion and absorption of the patients, but a guarantee of good nutrition may be an important reason for the improvement of immune function.

The study also has certain defects. Although this research is a prospective randomized controlled study, the diseases included in the study are complex, so the evaluation of the rehabilitation effect may be influenced by other confounding factors and may produce a certain bias. This study is based on previous studies, but the strict method of limb functional exercises combined with Chinese medicine acupoint massage was not verified before the study.

By designing a randomized controlled study, we found that limb functional exercises combined with gastrointestinal acupoint massage rehabilitation has greater advantages for elderly bedridden patients compared with single limb functional exercises. Limb functional exercises combined with Chinese medicine acupoint massage can not only more effectively improve patients' nursing satisfaction and quality of life, but it can also improve patients' gastrointestinal function. The improvement in immune function may be related to the improvement of gastrointestinal function.

Disclosure of conflict of interest

None.

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