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Original Article

Roy Adaptation Model-Based nursing care improves quality of life for elderly burn patients

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Abstract: Objective: To explore the effects of the Roy Adaptation Model on psychological resilience and nutritional status in elderly burn patients. Methods: Retrospectively, 112 elderly burn patients undergoing routine nursing care based on the Roy Adaptation Model were enrolled as the observation group, and another 112 patients receiving routine nursing care only were selected as the control group. The psychological resilience, level of hope, immunity, emotions, quality of life and sleep of enrolled patients were assessed. Results: In the observation group, patients were observed with markedly improved psychological resilience, notably higher hope and SF-36 scores, significantly lower Self-Rating Anxiety Scale, Self-Rating Depression Scale, Self-Rating Anxiety Scale and Pittsburgh Sleep Quality Index, as well as markedly elevated serum albumin, prealbumin, and hemoglobin, IgM and IgG levels, in contrast to the control group (all $P<0.05$). Conclusion: Nursing care based on the Roy Adaptation Model can significantly enhance the psychological resilience and hope, improve emotions, pain and sleep quality, strength nutritional absorption and immunity when applied in elderly burn patients, so as to increase their compliance with treatment and quality of life.

Keywords: Burn, Roy Adaptation Model, nursing care, psychological resilience, nutritional status

Introduction

Elderly burn patients represent a special clinical population. Due to age-related decline in physiological function, weakened immune systems, and the presence of underlying chronic diseases, they face great challenges in the recovery process following burn injuries. Burns not only cause severe physical harm but also lead to a range of psychological and physiological adaptation problems. Studies have shown that approximately 12.5% to 22% burn patients experience significant anxiety, 51.3% suffer from insomnia, and there is a 2.21 times higher risk for them to have depression in comparison to the general population [1, 2]. In addition, post-burn malnutrition is one of the key factors contributing to delayed recovery in elderly burn patients. Deterioration in nutritional status not only impairs wound healing but also increases the risk of infections and complications [3]. Studies have shown that elderly burn patients commonly exhibit a hypermetabolic response, leading to accelerated depletion of nutritional reserves. When combined with preexisting malnutritional conditions, the catabolic rate in the body can reach 1.5 to 2 times that of normal levels [4, 5].

The Roy Adaptation Model is a nursing theory that emphasizes achieving physiological and psychological balance through adaptive behaviors. This model advocates enhancing patients' adaptive capacity to help them regain equilibrium across physical, psychological, and social dimensions, thereby improving their overall health and quality of life [6]. Previous studies have confirmed that the Roy Adaptation Model demonstrates significant clinical value in various fields, including oncology, postoperative rehabilitation, chronic disease management, and trauma care. It has been shown to have efficacy in enhancing patients' adaptability and improving their psychological well-being, physiological functions, as well as quality of life [7-10]. Although some recent studies in and outside China have applied the Roy Adaptation Model to the care of elderly burn patients pri-

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marily focusing on pain management and quality improvement of life, few have explored its impact on psychological resilience and nutritional status in depth [11]. Therefore, this study aims to investigate the effects of nursing interventions based on the Roy Adaptation Model on psychological resilience, nutritional status, and quality of life in elderly burn patients, with the goal of providing guidance for the implementation of nursing strategies in clinical settings.

Materials and methods

Case selection

A total of 112 elderly burn patients undergoing routine nursing care based on the Roy Adaptation Model from January 2021 to February 2024 at the Affiliated Hospital of Jiangnan University were enrolled as the observation group. Additionally, another 112 patients receiving routine care only during the same period were selected to form the control group. The general information of patients in both groups is shown in the Results section 2.1. The study was approved by the Medical Ethics Committee of the Affiliated Hospital of Jiangnan University.

Inclusion criteria: Patients were eligible for the study if they were aged 60 or above; they suffered from burn injuries caused by various sudden accidents; they were admitted to the hospital no more than 72 hours before receiving designated treatments, with burn area (%TBSA) ranging between 5% and 50%; their medical records were complete and traceable; their cognitive functions were normal, with an ability to do various activites (MMSE scores ≥24).

Exclusion criteria: Patients were excluded from the study if they were aged under 60; they had severe organic or psychological diseases; they completed treatment and follow-up as per required; they voluntarily withdrew or dropped out from the study due to other reasons; they were concurrently receiving other systemic intervention research; they had severe psychological or neural disorders.

Nursing interventions

Patients in the control group received routine nursing care [12]. Routine nursing care included: immediate fluid resuscitation upon admission to prevent hypovolemic shock, maintenance of fluid and electrolyte balance according to patients' conditions, administration of anti-inflammatory medications and nutritional supplements, and maintenance of dry wound. Patients received routine care for their wound scares and offered knowledge about how scars are formed, with each of their inquiries answered patiently by medical staff. Based on their pain levels, appropriate analgesic treatment was given. Moreover, patients were guided to do exercises to help their body function recovery and reminded constantly not to tear off the scabs themselves. Meanwhile, patients were followed up regularly and required to revisit the hospital for examinations.

Patients in the observation group received nursing care based on the Roy Adaptation Model [6]. Specific measures included: 1) Establishment of an integrated nursing team based on the Roy Adaptation Model: This team consisted of 6 members, including a chief physician, a head nurse, two leaders from the nursing team, and two charge nurses. To begin with, a scientific and comprehensive nursing regimen was created by the team members working together. Next, all team members received uniform training to acquire skills and knowledge required for the nursing regimen. 2) Assessment of physiological symptoms: Pain, functional limitations, and limb numbness of patients were assessed. In addition, measures to manage patients' pain, guide their rehabilitation and improve sleep quality were determined as well. 3) Cognitive education strategy: To help patients understand what treatment and rehabilitation processes they were going to have, and to improve their compliance with the processes, cognitive education strategies were implemented with aims to improve their compliance with nursing interventions. 4) Improvement of role function: Psychological counseling, scar management, and encouragement for restoring daily self-care were carried out to help patients relieve anxiety and restore their family and social roles. 5) Loneliness alleviation: Family members were encouraged to offer companionship and support to patients, and interact with them on a regular basis to alleviate their loneliness and sensitivity to emotions.

Data collection

Primary observation indicators: 1) Psychological resilience assessment: The Connor-Davidson Resilience Scale (CD-RISC) was used to evaluate the psychological resilience of patients in the two groups in terms of three aspects: perseverance, self-reliance, and optimism. The scale has a maximum score of 100, with higher scores indicating stronger psychological resilience [13]. 2) Nutritional status comparison: After fasting overnight, 3 mL of venous blood was drawn from the patients' elbow to determine the levels of serum albumin, prealbumin, and hemoglobin using an automatic biochemical analyzer (Hitachi 7600, Shanghai Huanxi Medical Equipment Co., Ltd.). 3) Anxiety level comparison: Anxiety levels were assessed using the Self-Rating Anxiety Scale (SAS). A score of 50 or higher suggests the presence of anxiety symptoms, with higher scores indicating more severe anxiety [14]. 4) Depression status assessment: Depression levels were evaluated using the Self-Rating Depression Scale (SDS). Scores between 53 and 62 indicate mild depression, 63 to 72 indicate moderate depression, and scores above 72 indicate severe depression. Higher scores reflect more severe depression [15].

Secondary observation indicators: 1) Sleep quality assessment: The Pittsburgh Sleep Quality Index (PSQI) was used to compare sleep quality of patients between the two groups [16]. This scale consists of 19 self-assessment questions and 5 questions rated by their sleep partners. The 19 questions cover seven dimensions, with each dimension scoring from 0 to 3. The total score from all dimensions constitutes the PSQI score, which ranges from 0 to 21. A higher score indicates poorer sleep quality. 2) Quality of life assessment: The Health Survey Short Form (SF-36) was used to evaluate patients' quality of life. This questionnaire includes five main sections: physical functioning, general health, social functioning, emotional role, and mental health, with each section having a maximum score of 100 points [17]. 3) Hope level measurement: The Herth Hope Index was used to measure patients' level of hope before and after the intervention. The maximum score is 48, with higher scores indicating greater levels of hope [18]. 4) Pain assessment: The Visual Analog Scale (VAS) was used to assess patients' pain [19]. Patients were asked to mark their pain level on a line with 10 points labeled, where 0 represents no pain and 10 represents extreme pain. 5) Immunoglobulin concentration measurement: A 5 mL fasting blood sample was obtained from patients, and separated using a centrifuge. BNProSpec Immunoturbidimeter (Diagnostic Products Co., Ltd.) was employed to measure the concentrations of IgG and IgM (IgG Kit, Catalog number JC-BS-IgG-202; IgM Kit, Catalog number JC-BS-IgM-305; Nanjing Jiancheng Bioengineering Institute Co., Ltd.). 6) Social function impairment evaluation: The Social Function Deficit Screening Scale (SFDSS) was used to evaluate patients' social function impairment. The scale contains 10 items, with higher total scores indicating severer social function impairment [20]. 7) Adherence evaluation: A self-designed questionnaire was used to evaluate patients' adherence to rehabilitation treatment (e.g., follow-up, treatment execution, and nutritional support). The adherence rate was calculated using the formula: Adherence rate = (the number of adherent samples/the total samples) × 100%. 8) Family member satisfaction assessment: The primary caregivers of patients were invited to complete a satisfaction survey to measure their satisfaction with the hospital's nursing care. The satisfaction levels were graded as: Satisfied (90-100 points), Generally Satisfied (60-89 points), and Dissatisfied (<60 points). The satisfaction rate was calculated using the formula: Satisfaction rate = (the number of satisfied and generally satisfied cases/the total cases) × 100%.

Statistical analysis

All data were analyzed using SPSS 20.0. For continuous variables, normality was assessed using the Shapiro-Wilk test; normally distributed data were expressed as mean ± standard deviation, with between-group comparisons carried out by independent samples t-test and within-group comparisons (pre- vs. post-intervention) by paired t-test. Categorical data were presented as n (%), with between-group differences assessed by the χ^2 test or Fisher's exact test (if expected frequencies were <5). All tests were two-sided, and a *P*-value <0.05 was considered statistically significant.

Table 1. Comparison of general baseline data between the two groups (n/%)

Indicators	Observation group (n=112)	Control group (n=112)	t/χ^2	P
Age (years)	74.56±6.27	75.02±6.36	0.545	0.586
Gender			0.072	0.789
Male	56	54		
Female	56	58		
Burn area (%TBSA)	23.45±5.62	22.98±5.41	0.638	0.524
Burn depth			0.162	0.687
Depth II	63	60		
Deep III	49	52		
Cause of burn			0.021	0.989
Thermal burn	54	53		
Electric burn	41	42		
Chemical burn	17	17		
Concomitant disease				
Diabetes	33	31	0.087	0.767
Hypertension	45	47	0.074	0.786
Heart disease	28	30	0.093	0.760
History of liver disease	17	19	0.132	0.716
Chronic kidney disease	13	15	0.163	0.686
Smoking	52	55	0.161	0.688
Tipple	41	43	0.076	0.783
Weight (kg)	65.4±8.5	64.7±8.3	0.624	0.534
Length of hospital stay (days)	28.2±6.7	27.9±6.9	0.330	0.742

Note: %TBSA: The ratio of the patient's burned area to its total body surface area.

Results

Comparison of baseline data between the two groups

There were no statistically significant differences between the two groups in terms of age, gender, weight, length of hospital stay, burn area, burn depth, burn causes, or comorbidities (all P>0.05). See **Table 1**.

Comparison of psychological resilience between the two groups

Before interventions, there were no statistically significant differences between the observation and control groups in the scores of psychological resilience, self-strength, and optimism, as well as the total score on the CD-RISC (P>0.05). However, after interventions, both groups showed improvements in the scores for the three dimensions of CD-RISC and the total score. Notably, the observation group exhibited significantly better scores in the dimensions of psychological resilience, self-strength, and optimism, as well as the total score, compared to the control group (P<0.05). See **Table 2**.

Comparison of anxiety and depression between the two groups

Before interventions, there were no significant statistical differences in the SAS and SDS scores between the two groups (P>0.05). However, after interventions, both groups showed significant decreases in their scores. Notably, in the observation group, the SAS and SDS scores were significantly lower compared to the control group (both P<0.001). See **Figure 1**.

Comparison of quality of life between the two groups

Before interventions, no significant statistical differences were observed in the quality of life between the two groups (P>0.05). After interventions, the scores for quality of life assessment of patients in the observation group were significantly improved in several dimensions, including physical function, overall health sta-

Table 2. Comparison of CD-RISC scores between the two groups

Group	Tenacity		Self-improvement		Optimistic		Total scores	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation group (n=112)	20.35±1.30	36.12±3.12#	14.32±1.21	22.69±2.83#	7.44±1.21	11.03±1.95#	45.12±4.96	70.16±7.42#
Control group (n=112)	20.65±1.03	29.87±2.73#	14.19±0.85	15.15±3.03#	7.32±1.35	8.70±1.80#	45.19±5.01	53.77±8.32#
t	1.226	3.257	0.825	6.148	1.615	4.578	0.086	4.543
P	0.225	0.043	0.408	0.020	0.107	0.025	0.913	0.021

Note: Compared with before intervention, #P<0.05.

Table 3. Comparison of quality of life scores between the two groups (score, $\bar{x}\pm s$)

Group	Somatic function		General health		Social function		Emotional role		Mental health	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation group (n=112)	62.11±8.54	78.21±11.17#	81.21±11.82	92.62±7.20#	60.20±10.21	73.84±11.22#	50.53±8.12	64.77±9.65#	49.41±7.51	69.21±10.88#
Control group (n=112)	62.33±8.05	66.16±9.32#	81.28±9.22	86.63±12.11#	60.87±10.22	65.53±10.34#	50.57±8.17	56.41±7.22#	49.40±7.43	56.32±7.66#
t	0.198	8.766	0.049	4.499	0.491	5.764	0.037	7.341	0.01	10.252
P	0.843	<0.001	0.961	<0.001	0.624	<0.001	0.971	<0.001	0.992	<0.001

Note: Compared with before intervention, #P<0.05.

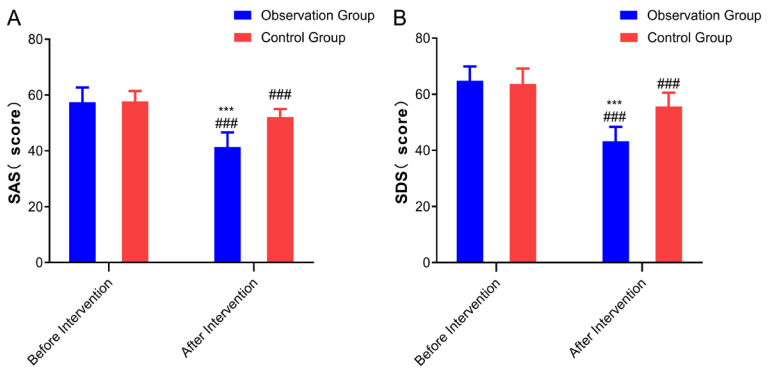

Figure 1. Comparison of SAS and SDS scores between the two groups. A: Comparison of SAS scores between the two groups; B: Comparison of SDS scores between the two groups. Compared with the control group, ***P<0.001; Compared with before intervention, ###P<0.001. SAS: Self-Rating Anxiety Scale; SDS: Self-Rating Depression Scale.

tus, social ability, emotional state, and mental health, compared to the control group (all P<0.01). See **Table 3**.

Comparison of sleep quality between the two groups

Before interventions, there were no significant differences in PSQI scores between the two groups (P>0.05). After interventions, the PSQI scores generally decreased in both groups, with the observation group showing a significantly lower PSQI score compared to the control group (all P<0.001). See **Figure 2**.

Comparison of nutritional status between the two groups

Before interventions, there were no significant statistical differences between the two groups in the levels of serum albumin, prealbumin, and hemoglobin (P>0.05). After interventions, both groups showed significant improvements in the three levels, with the observation group demonstrating higher levels in comparison to the control group (all P<0.001). See **Table 4**.

Comparison of social function scores between the two groups

Before interventions, there were no significant statistical differences in the SFDSS scores between the two groups (P>0.05). After interventions, both groups showed significant decreases in their SFDSS scores, with the observation group showing a more significant reduction compared to the control group (all P<0.001). See **Figure 3**.

Comparison of pain scores between the two groups

Before interventions, there were no significant statistical differences in the VAS scores between the two groups (P>0.05). However, after interventions, both groups showed marked decreases in their VAS scores, with the observation group showing notably lower VAS scores compared to the control group (all P< 0.001). See **Figure 4**.

Comparison of immunoglobulin levels between the two groups

Before interventions, there were no significant statistical differences in the IgM and IgG levels between the observation and control groups (P>0.05). After interventions, the IgM and IgG levels were elevated in both groups, with those in the observation group being higher when compared to the control group (P<0.05). See **Figure 5**.

Comparison of rehabilitation treatment adherence between the two groups

When observing adherence to treatment regimen, follow-up time, and nutritional supplementary, the observation group demonstrated higher adherence compared to the control group (P<0.05). See **Table 5**.

Comparison of nursing satisfaction between the two groups

The satisfaction scores of care caregivers in the observation group were significantly higher than those in the control group (P<0.05). See **Figure 6**.

Discussion

It was found in the study that the psychological resilience scores of patients in the observation group were significantly higher in comparison to the control group. This result is consistent with the research by Krstic B and Ozdemir O et al. [21, 22]. The reason for this improvement lies in the focus of the Roy Adaptation Model-based nursing care on enhancing patients' adaptive behaviors, providing social support,

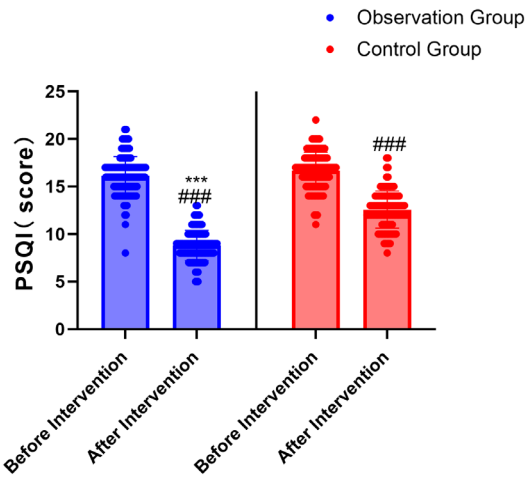

Figure 2. Comparison of PSQI scores between the two groups. Note: Compared with the control group, ***P<0.001; Compared with before intervention, ###P<0.001. PSQI: Pittsburgh Sleep Quality Index.

and offering psychological counseling to help them strengthen their coping abilities in the face of challenges. Additionally, the Roy Adaptation Model helps patients improve their understanding and acceptance of their physical and psychological states by enhancing their knowledge about the illness and treatment process, further contributing to an increase in psychological resilience.

Studies have shown that approximately 30% of patients with broad-area burns suffer from chronic pain, which is also the cause of their anxiety and depression [23]. Among patients with severe burn injuries, about 23.7% may develop depression within six months after the injury, with these symptoms potentially lasting up to 24 months post-injury [24]. In this research, it was reported that the anxiety levels (assessed by the SAS) and depression severity (evaluated using the SDS) in the observation group were significantly better than those in the control group, suggesting that Roy Adaptation Model-based nursing care significantly mitigated the anxiety and depression levels in elderly burn patients, which is consistent with the findings of Aydogdu O et al. [25]. The underlying mechanism lies in the fact that the employment of Roy Adaptation Model-based nursing care strengths social support networks, provides targeted emotional counseling, and implements personalized lifestyle interventions to help patients develop problem-coping strategies, thereby being particularly suited to address the diminished psychological adaptability of elderly populations resulting from physiological decline and the burden of chronic diseases.

Elderly burn patients often face high metabolic rates and nutritional depletion, with malnutrition being a significant factor affecting their recovery, especially during the post-burn healing process [26]. The study found that patients in the observation group had significantly higher levels of serum albumin, prealbumin, and hemoglobin compared to the control group. This suggests that the addition of the Roy Adaptation Model to nursing care has enhanced the effectiveness of nutritional interventions, thereby promoting the wound healing process and improving patients' overall health status. Additionally the observation group had notably higher levels of IgM and IgG when compared to the control group, indicating patients receiving Roy Adaptation Model-based nursing care showed better immune function, enabling them have a quicker respond when facing post-burn immune challenges. The Roy Adaptation Model focuses on the holistic recovery of patients' health, integrating nutritional support and functional rehabilitation training to help improve both their physiological function and psychological state, ultimately enhancing their quality of life. The observation group showed significantly higher scores across all dimensions of the scale for assessing quality of life compared to the control group. This finding aligns with the results of Feng K's study, further supporting that Roy Adaptation Model-based nursing interventions not only improved patients' nutritional status but also strengthened their physiological function and psychological adaptation, ultimately improving their overall quality of life [27].

Studies have shown that elderly burn patients often experience a significant fear of "being excluded", leading to active avoidance of social activities and a 46% reduction in social engagement [28]. Other findings have also indicated that nursing interventions based on the Roy Adaptation Model have significant effects on improving patients' social functions [29].

In this research, the observation group showed significantly higher compliance with treatment

Table 4. Comparison of nutritional status between the two groups

Group	Alb (g/L)		PA (mg/L)		Hb (g/L)	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation group (n=112)	25.07±6.76	34.12±2.88#	120.53±18.20	247.13±8.11#	71.22±9.14	85.34±5.12#
Control group (n=112)	24.87±6.72	28.77±2.32#	121.46±17.11	185.43±8.14#	71.26±9.08	76.31±5.64#
t	0.222	15.31	0.394	56.827	0.033	12.546
P	0.824	<0.001	0.694	<0.001	0.974	<0.001

Note: Compared with before intervention, #P<0.05. Alb: Albumin; PA: Prealbumin; Hb: Hemoglobin.

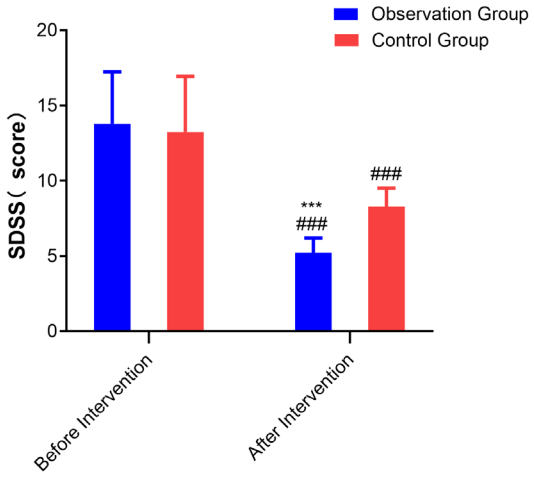

Figure 3. Comparison of SDSS scores between the two groups. Note: Compared with the control group, ***P<0.001; Compared with before intervention, ###P<0.001. SDSS: Social Disability Screening Schedule.

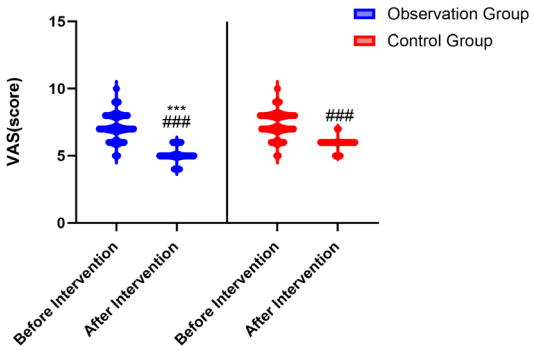

Figure 4. Comparison of VAS scores between the two groups. Note: Compared with the control group, ***P<0.001; Compared with before intervention, ###P<0.001. VAS: Visual Analog Scale.

regimen, follow-up attendance, and nutritional support compared to the control group. This suggested that nursing intervention based on the Roy Adaptation Model significantly benefited patients during the whole treatment and

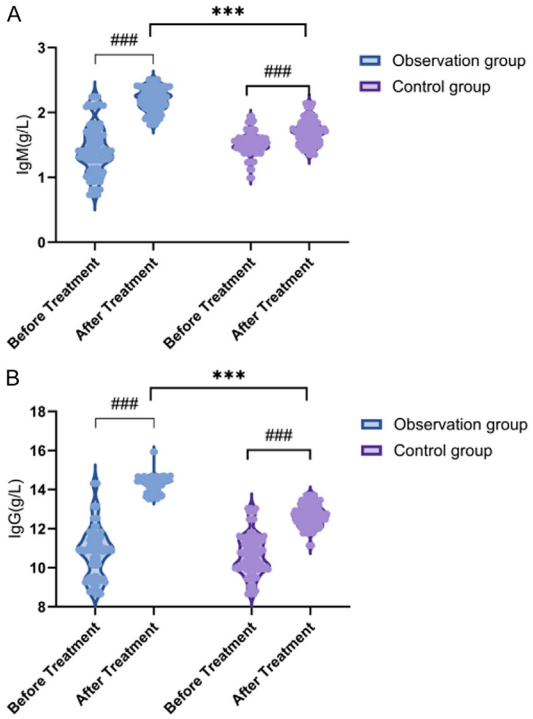

Figure 5. Comparison of immunoglobulin levels between the two groups. A: IgM comparison between the two groups, B: IgG comparison between the two groups. Note: Compared with the control group, ***P<0.001; Compared with before treatment, ###P<0.001.

recovery processes. In addition, the satisfaction scores by caregivers to nursing care from the hospital were markedly higher in the observation group in comparison to the control group, suggesting patients in the observation group received more satisfaction. Nursing care based on the Roy Adaptation Model not only focuses on the physical and psychological health of patients but also emphasizes the involvement and support of family members, as the model recognizes the significant role that family support plays in patient recovery. By educating family members with necessary

Table 5. Comparison of patients' compliance between the two groups (n, %)

Group	Treatment compliance	Follow-up compliance	Nutritional support
Observation group (n=112)	102 (91.07)	104 (92.86)	102 (91.07)
Control group (n=112)	84 (75.00)	80 (71.43)	82 (73.21)
χ^2	10.268	17.530	12.174
P	0.001	<0.001	0.001

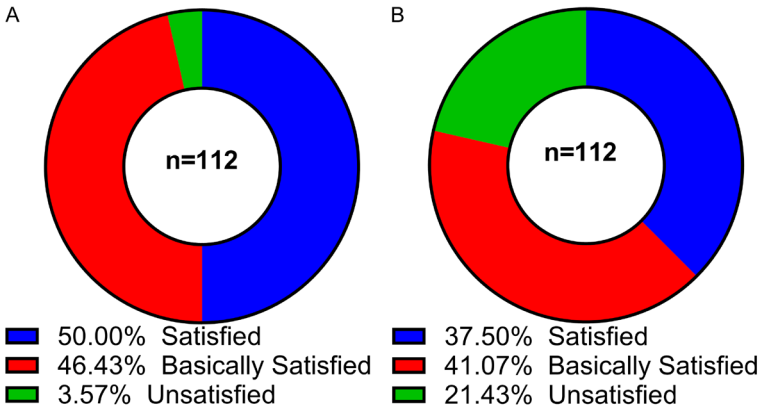

Figure 6. Comparison of satisfaction of core family caregivers between the two groups. A: Distribution of the satisfaction results in the observation group, B: Distribution of the satisfaction results in the control group.

medical knowledge, increasing their companionship and offering them with emotional support, their emotional burden and stress were notably alleviated, thereby increasing their satisfaction towards the nursing care provided by the hospital.

Although this study provides beneficial evidence of employing the Roy Adaptation Model in elderly burn patients, it also has some limitations. This study was performed retrospectively and lacks a randomized controlled trial design, resulting in the existence of possible bias in sample selection, which could affect the conclusion of the results. Future research should consider using randomized controlled trials to strengthen the validation of these findings. Additionally, the follow-up time in this study was relatively short. Thus, a comprehensive assessment of long-term effects was not possible. Future studies should extend the follow-up period to better evaluate the impact of the Roy Adaptation Model on patients' long-term health outcomes. Although we conducted a comprehensive assessment of patients' physical and psychological symptoms, we did not explore other factors that could influence recovery, such as social support and cultural background. Future research could take these factors into account to further enrich the understanding of patient recovery.

In conclusion, this study has demonstrated that Roy Adaptation Model-based nursing interventions significantly improve psychological resilience, social function, hope levels, anxiety, depression, quality of life, sleep quality, and nutritional status in elderly burn patients, while also enhancing the satisfaction of family members towards nursing care.

Disclosure of conflict of interest

None.

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