Article

3R Nursing Combined with Dietary and Nutritional Interventions Enhances Self-care Ability in Elderly Patients with Vascular Dementia

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Abstract

Background: Vascular dementia (VD) is an extremely common neurological dysfunction in the elderly population, and greatly affects the patient's ability to take care of themselves. Recent research suggests that VD patients need more targeted and individualized nursing during treatment, so as to enhance cognitive function and therapeutic efficacy. The objective of this study is to observe the effect of reminiscence, reality, and remotivation (3R) nursing combined with dietary and nutritional interventions on elderly patients with VD, so as to provide clinical evidence for the management of VD in older adults.

Methods: 120 elderly VD patients admitted between December 2022 and December 2023 were selected, including 64 cases receiving 3R nursing combined with dietary and nutritional interventions (the research group) and 56 cases receiving routine nursing (the control group). The two groups were compared in terms of neurological function, self-care ability, and nutritional status before and after nursing, as well as nursing compliance. After the completion of the care, patients' quality of life and family satisfaction were investigated.

Results: In comparison with the control group, the research group displayed higher scores on the Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA), greater self-care ability, and higher levels of nutritional proteins and grip strength ($p < 0.05$). In

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addition, patients in the research group displayed greater nursing compliance and quality of life of patients, as well as higher family satisfaction ($p < 0.05$).

Conclusions: 3R nursing combined with dietary and nutritional interventions can effectively improve the neurological function of VD patients and enhance their self-care ability.

Keywords

Introduction

Vascular dementia (VD) is a common disease in neurology, with a prevalence rate of up to 1.5% in elderly people aged 65 and above, second only to Alzheimer's disease as a type of dementia [1]. As a vascular lesion, VD is closely related to cerebrovascular damage, and as the disease progresses, it can gradually damage nerve cells in the brain, resulting in severe impairment of patients' advanced cognitive functions such as memory, attention, executive function, and language; patients can also have difficulty in taking care of themselves in daily life [2]. There is currently no effective clinical cure for VD. The main countermeasures involve efforts to relieve symptoms and slow down disease progression, such as controlling chronic diseases (e.g., hypertension, hyperlipidemia, and diabetes), eating a reasonable diet, insisting on moderate exercise, reducing bad mood, and having regular check-ups, so as to improve patients' cognitive function and extend their survival [3,4].

Recent research suggests that VD patients need more targeted and individualized nursing during treatment, so as to enhance cognitive function and therapeutic efficacy. Among them, reminiscence, reality, and remotivation (3R) nursing is a new care model based on neurological, cognitive, and psychological theories combined with clinical practice; this model is characterized by its remarkable effects on strengthening human memory, thinking, and intelligence [5,6]. At present, 3R nursing has shown excellent application value in the treatment of various neurological diseases, such as cerebral infarction and cerebral ischemia-reperfusion injury, significantly enhancing patients' neurological function [7,8]. However, its application in VD has not yet been reported. At the same time, due to the commonly observed cognitive impairment, VD patients generally have irregular diets in daily life, with high prevalence of insufficient intake, food refusal, and hyperphagia [9]. These negative effects are not only detrimental to the patient's nutritional status, but may also increase the risk of neurological dysfunction in patients with VD, causing a more pronounced deterioration in their quality of life. Targeted nursing interventions and nutritional interventions, on the other hand, can largely avoid these problems and provide a more reliable prognosis for patients with VD.

As the global population ages, the incidence of VD is increasing year by year [10]. Due to this trend, the present study was designed to explore the comprehensive impact of 3R nursing combined with dietary and nutritional interventions on elderly VD patients, so as to improve the prognosis of VD patients in the future.

Materials and Methods

Patients

One hundred and twenty elderly VD patients admitted to our hospital from December 2022 to December 2023 were selected. Among them, 64 patients who received 3R nursing combined with dietary and nutritional interventions were included in the research group, and 56 patients who received routine nursing were included in the control group. This study was conducted in strict compliance with the Declaration of Helsinki and all subjects provided informed consent.

Eligibility and Exclusion Criteria

Inclusion criteria: The patients (>60 years old) all conformed to the relevant diagnosis of senile VD [11] and were diagnosed by imaging examination, with complete clinical data and high family compliance; both the patients and their family members were aware of the content of the study and provided informed consent. Exclusion criteria: Patients in the terminal stage with severe mental disorders, those with comorbidities such as depression or other mental illnesses, patients with heart and kidney failure, or immune system diseases, and those who could not receive complete treatment due to various reasons were excluded.

Methods of Care

Control group: After admission, the patients were given health and medication guidance, and were provided with measures such as vital sign monitoring, psychological care (if there were negative emotions), and complication prevention. After discharge, patients were followed up continuously by telephone. Research group: First, a dedicated nursing team was set up, consisting of attending neurologists, head nurses, and nursing staff of the neurology department. They worked together to build a nursing plan, strengthened nursing implementation, and carried out regular training to constantly optimize nursing methods. In the daily medication guidance for patients, nurses supported the efforts of family members to manage and supervise the patients, and asked family members about their questions regarding the nursing process and where they needed help, thus gradually enhancing their awareness of nursing assistance. When conducting environmental memory training on patients, aspects of their spatial memory recall, such as home address, residential street, etc., were strengthened. Patients' expression and cognitive abilities were trained by watching TV and videos. Nurses guided patients' behavioral activities according to their daily living habits, mainly by describing first and then simulating to strengthen patients' memory. The patients were also given memory remotivation training; they were asked questions about their family members' composition and names, and their reasoning, calculation, and analytic abilities were trained through simple mathematical calculations and puzzles. For those with negative emotions, the nursing staff cooperated with the patients' families to give timely psychological intervention to alleviate the illness and adverse moods. In addition, dietary and nutritional interventions were provided for patients. Based on the patient's condition, eating time and dietary nutrition were formulated, including amounts of carbohydrates, proteins, vitamins, trace elements, etc., with a light diet as the main focus, which is conducive to the patient's digestion. In addition, patients' diets were adjusted to improve blood lipid measures and other indicators, which also has a positive effect on promoting myocardial blood circulation. Before discharge, patients were given detailed rehabilitation training and dietary norms, and their family

Table 1. Comparison of clinical data.

Groups	n	Age	Sex	History of hypertension	History of diabetes
			Male/Female	Yes/No	Yes/No
Control	56	68.5 ± 4.1	30 (53.6)/26 (46.4)	40 (71.4)/16 (28.6)	29 (51.8)/27 (48.2)
Research	64	68.7 ± 4.3	39 (60.9)/25 (39.1)	51 (79.7)/13 (20.3)	35 (54.7)/29 (45.3)
χ^2/t		0.260	0.663	1.112	0.101
p		0.796	0.416	0.292	0.751

Figure 1A

Figure 1B
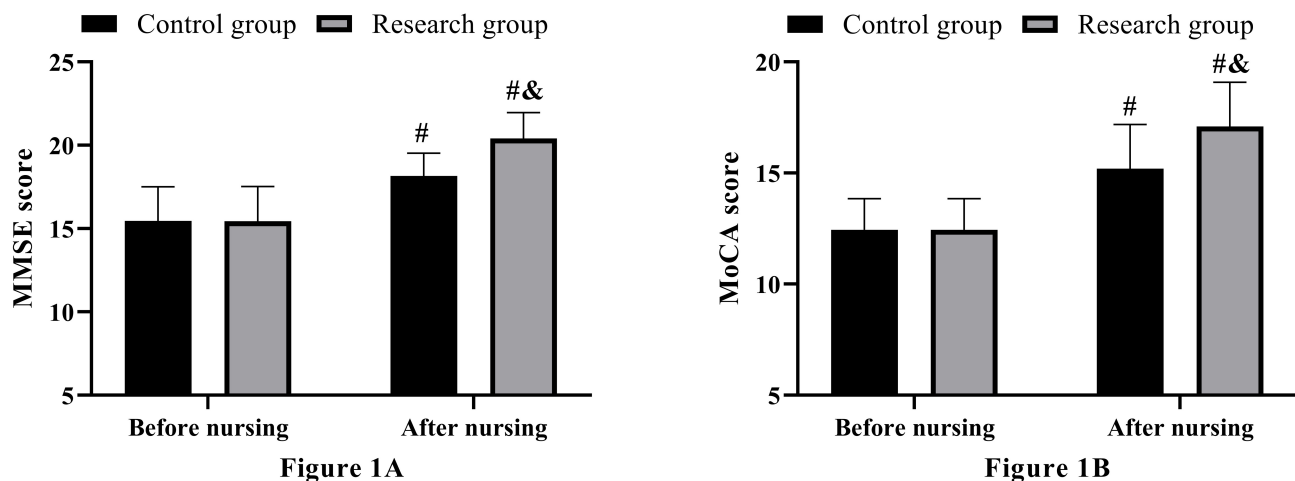
Fig. 1. Comparison of cognitive function. (A) Comparison of Mini-Mental State Examination (MMSE) score. (B) Comparison of Montreal Cognitive Assessment (MoCA) score. *vs.* before nursing #$p < 0.05$, *vs.* control group &$p < 0.05$.

members were required to assist and supervise. Patients were visited once a week through WeChat and other means of communication after discharge, with the training content adjusted according to their specific conditions, and were instructed to review regularly.

Outcome Measures

(1) Patients' cognitive function was assessed before and after nursing with the Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA) [12]; higher scale scores suggest a stronger cognitive function. (2) The Exercise of Self-care Agency Scale (ESCA) [13] was employed to evaluate self-care ability based on self-concept, self-responsibility, health knowledge, and self-care skills; higher scores suggest better self-care skills. (3) We used the Compliance Scale [14] to investigate patients' compliance, with a score of 80–100, 60–79, and ≤59 suggesting compliance, partial compliance, and non-compliance, respectively; total compliance rate = (compliance + partial compliance) cases/total cases ×100%. (4) Fasting venous blood was collected from patients before and after care to determine levels of the nutritional proteins albumin (ALB) and transferrin (TRF), as well as total protein (TP), with an automatic biochemical analyzer, and

the grip strength of the left and right hands was detected by a wrist developer (Shanghai Yingling Electronic Scale Co., Ltd., Shanghai, China). (5) The patients' quality of life was investigated one month after nursing by using the MOS Short-Form 36 Item Health Survey (SF-36) [15]. The assessment was made from eight dimensions, namely, role-physical (RP), vitality (VT), social functioning (SF), physical functioning (PF), bodily pain (BP), role-emotional (RE), general health (GH), and mental health (MH); the score is proportional to the quality of life. (6) After one month of nursing, the satisfaction of patients' families was investigated (anonymous scale). The results are divided into very satisfied (10 points), basically satisfied (7–9), and dissatisfied (≤6). The total satisfaction = (satisfied + basically satisfied) cases/total number of people × 100%.

Statistical Methods

SPSS v24.0 (IBM, Armonk, NY, USA) was used to statistically analyze the data. The Kolmogorov–Smirnov test was used to test the normality of the data. Comparisons of count data [n(%)], such as gender and treatment adherence, between the two groups were performed using the chi-square test; comparisons of continuous data ($\bar{x} \pm s$), such as age and MMSE scores, between the two groups were
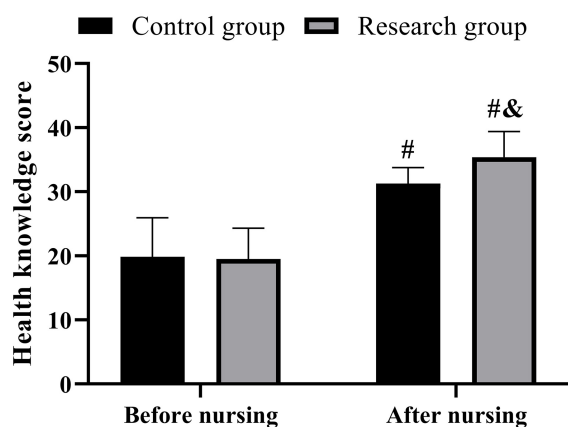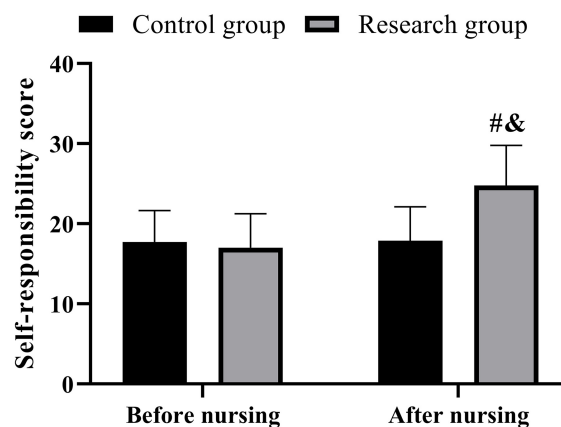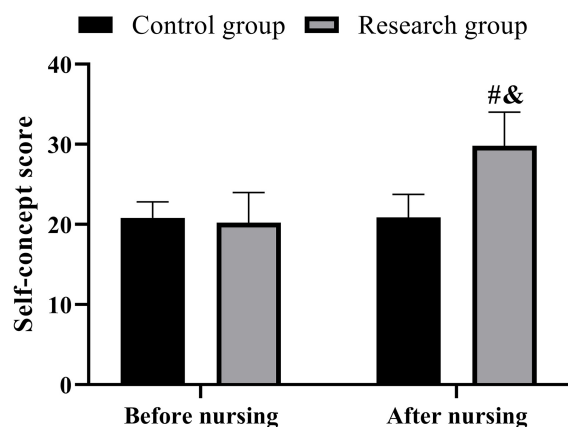
Figure 2A

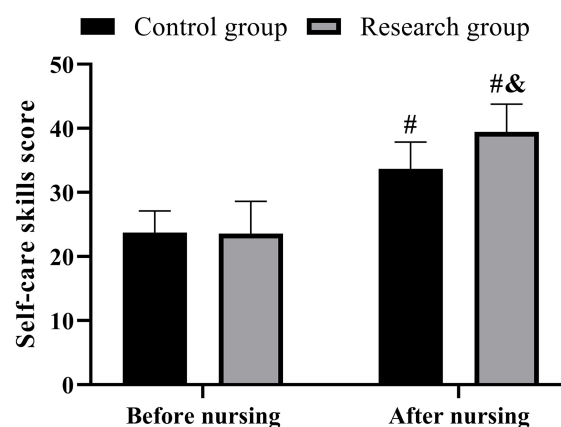**Figure 2B**

Figure 2C

Figure 2D

Fig. 2. Comparison of self-care ability. (A) Comparison of health knowledge score. (B) Comparison of self-responsibility score. (C) Comparison of self-concept score. (D) Comparison of self-care skills score. *vs.* before nursing #$p < 0.05$, *vs.* control group &$p < 0.05$.

performed using the independent samples *t*-test, and comparisons of the same group before and after care were performed using the paired *t*-test. The non-parametric Mann–Whitney U test was used to compare the two groups for measures that did not conform to normal distribution. *p* values < 0.05 were considered statistically significant for all analyses.

Results

Comparison of Clinical Data

We found no significant differences when comparing age, sex, hypertension/diabetes history, and other clinical data between the two groups (all $p > 0.05$) (Table 1).

Comparison of Cognitive Function

MMSE and MoCA scores were not significantly different between groups before nursing (all $p > 0.05$). Both groups showed an increase in MMSE and MoCA scores after care, especially in the research group (all $p < 0.05$) (Fig. 1).

Comparison of Self-care Ability

The two groups were similar in ESCA scores before care (all $p > 0.05$). After nursing, the scores for self-concept and self-responsibility in the control group were not significantly different (all $p > 0.05$), whereas the scores for health knowledge and self-care skills increased (all $p < 0.05$); the scores for all the four dimensions in the research group increased after care, and were higher compared with those in the control group (all $p < 0.05$) (Fig. 2).

Table 2. Comparison of compliance.

Groups	n	Compliance	Partial compliance	Non-compliance	Total compliance rate
Control	56	22 (39.29)	23 (41.07)	11 (80.36)	80.36
Research	64	34 (53.13)	26 (40.63)	4 (6.25)	93.75
χ^2					4.898
p					0.027
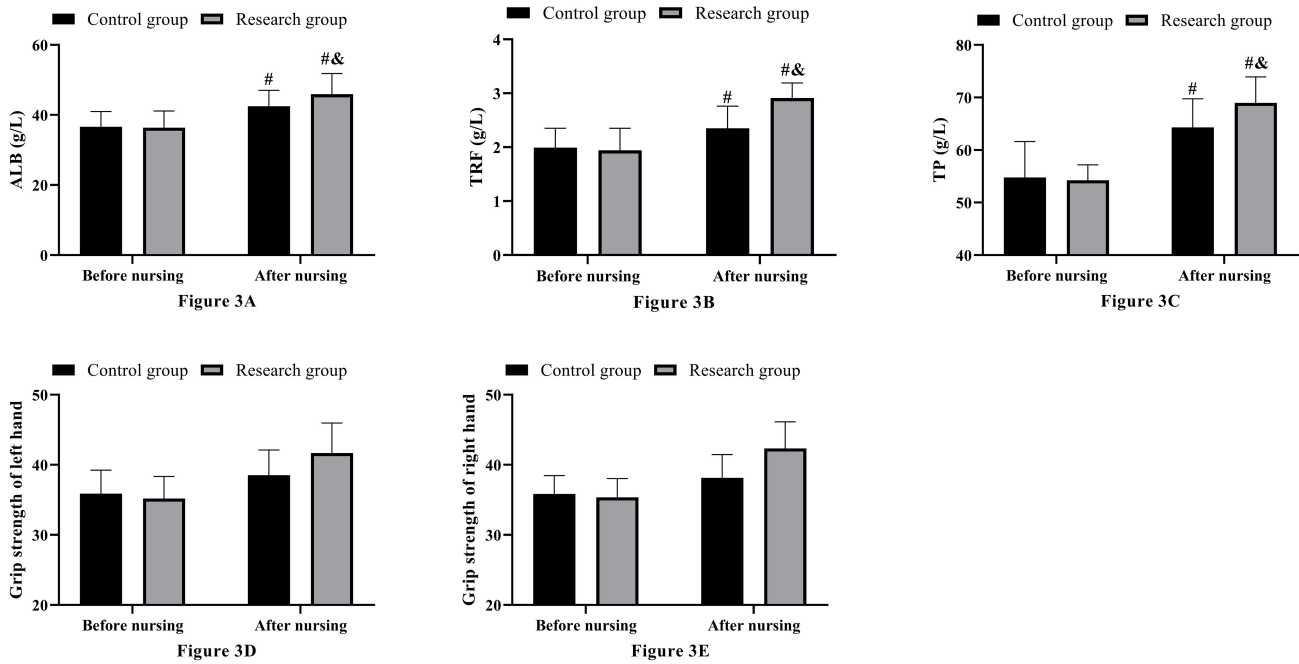
Fig. 3. Comparison of nutritional status. (A) Comparison of albumin (ALB). (B) Comparison of transferrin (TRF). (C) Comparison of total protein (TP). (D) Comparison of grip strength of the left hand. (E) Comparison of grip strength of the right hand. *vs.* before nursing #$p < 0.05$, *vs.* control group &$p < 0.05$.
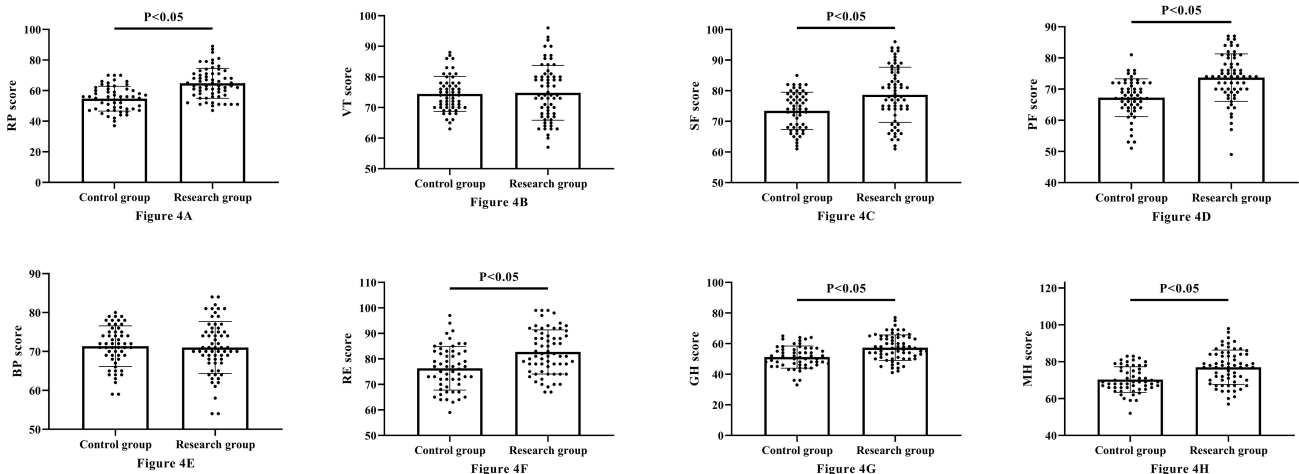
Fig. 4. Comparison of quality of life. (A) Comparison of role-physical (RP) score. (B) Comparison of vitality (VT) score. (C) Comparison of social functioning (SF) score. (D) Comparison of physical functioning (PF) score. (E) Comparison of bodily pain (BP) score. (F) Comparison of role-emotional (RE) score. (G) Comparison of general health (GH) score. (H) Comparison of mental health (MH) score.

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Table 3. Comparison of family satisfaction.

Groups	n	Satisfied	Basically satisfied	Dissatisfied	Total satisfaction
Control	56	25 (44.64)	17 (30.36)	14 (25.00)	75.00
Research	64	39 (60.94)	19 (29.69)	6 (9.38)	90.63
χ^2					5.250
p					0.022

Comparison of Compliance

The overall compliance rate was 93.75% in the research group and 80.36% in the control group, indicating a significantly higher total compliance rate in the research group ($p < 0.05$) (Table 2).

Comparison of Nutritional Status and Grip Strength

Before nursing, no significant differences were identified between groups in the results of nutritional protein and grip strength tests (all $p > 0.05$). After nursing, ALB, TRF, TP, and grip strength in both groups increased, with higher levels in the research group versus the control group (all $p < 0.05$) (Fig. 3).

Comparison of Quality of Life

The SF-36 survey results showed no significant group difference in BP or VT scores before care (all $p > 0.05$), whereas the scores for RP, SF, PF, RE, GH, and MH were higher in the research group than in the control group after nursing (all $p < 0.05$) (Fig. 4).

Comparison of Family Satisfaction

Finally, the family satisfaction investigation showed a total satisfaction rate of 90.63% and 75.00% in the research group and the control group, respectively, with statistically higher total satisfaction of family members in the research group ($p < 0.05$) (Table 3).

Discussion

VD, as one of the most common cerebrovascular diseases in modern clinical practice, has a serious negative impact on the health and life of patients [16]. How to provide more reliable treatment guarantees for VD patients is a hot spot in modern clinical medical research. This study revealed positive effects of 3R nursing combined with dietary and nutritional interventions on VD. These results can provide important guidance for the future treatment of VD.

First, the neurological function of the two groups was compared. The results showed higher MMSE and MoCA scores in the research group compared with the control group after nursing, suggesting significantly improved neurological function in the research group after nursing. In a previous study, Flynn A *et al*. [17] reported enhanced nerve function in patients with Alzheimer's disease after using 3R care, which is consistent with our research results. In addition, the self-care scores of the research group after nursing were also significantly higher compared to the control group, indicating that 3R nursing can provide more reliable prognostic life support for VD patients. The reason is that the core focus of 3R nursing is to improve the memory and cognition of patients by combining clinical practice with a focus on patient health and memory training [18]. During the nursing process, the 3R nursing model can improve patients' cognitive function and activities of daily living through measures such as memory retrieval training, spatial training, and remotivation training [19]. These positive effects are reflected in the increased MMSE and MoCA scores in the research group after nursing in this study. In addition, 3R nursing attaches importance to communication and information transmission with patients, and strengthens patients' cognition, memory, and intelligence, thereby promoting the recovery of self-care ability, and improving their living ability while reducing the burden on their families [20]. Therefore, the quality of life of the research group was more effectively improved after nursing. Saragih ID *et al*. [21] also reported that 3R nursing can enhance the daily living ability of patients with mild cognitive impairment, which supports our results. In their research study, they concluded that 3R nursing, which is multi-level, comprehensive, and pertinent, can alleviate patient symptoms, promote neurological function recovery, and improve patient quality of life, this nursing model also pays sufficient attention to psychological nursing, significantly improving patients' cognitive function, social function and self-care ability, and thus maximizing the effects of nursing [21]. This can also explain the higher SF-36 scores of the research group compared to the control group when investigating patients' quality of life. In addition, in previous studies, some researchers have also found that 3R care can improve the self-care ability of patients with Alzheimer's disease [6], which further supports the excellent prospects for clinical application value of 3R care in the future. As far as

treatment compliance is concerned, cognitive impairment in VD patients may lead to general resistance and rebellion towards medical staff, which is not only unfavorable for subsequent rehabilitation treatment, but also makes it difficult to achieve systematic targeted management [22]. Under the 3R nursing model, nurse-patient communication is allowed through television, videos, cards, and other means to strengthen nurse-patient interactions, enabling patients to fully experience humanistic care. In addition, conducting patient exchange meetings provides patients with opportunities for peer communication, especially for those with severe communication barriers, which can provide them with more access to effective communication, raise their enthusiasm for social activities, increase their participation in social activities, enhance their self-confidence and comfort, guide them to actively overcome difficulties, and significantly alleviate their psychological symptoms. All these measures can subtly improve patients' trust and dependence on medical staff during the nursing process, ultimately enhancing their compliance.

In the comparison of nutritional status, the research group showed a greater increase in nutritional proteins such as ALB, TRF, and TP after nursing, with better physical fitness test results. These results are speculated to be caused by the positive influence of dietary and nutritional interventions. As mentioned earlier, neurological dysfunction in VD patients often affects their normal dietary function [23]. Dietary and nutritional interventions greatly ensure the stability of the patient's nutritional status, providing a more reliable foundation for their recovery. Similarly, a study by Wickman BE *et al.* [24] found that dietary nutritional interventions had a positive effect on patients with heart failure, which is consistent with our findings.

Finally, as expected, family satisfaction was higher in the research group in the family satisfaction survey, which is also due to the beneficial effects of 3R nursing. 3R nursing continuously promotes the improvement of patients' cognitive function and helps them integrate into life as soon as possible by improving their living ability and enhancing their memory and thinking skills; moreover, it is also conducive to the implementation of rehabilitation training measures, ensuring rehabilitation effectiveness, improving patient prognosis, and naturally increasing family satisfaction.

However, aspects of the study design, in addition to the small sample size, are limitations of the current study. The study period was short, resulting in the inability to evaluate the long-term prognostic impact of 3R nursing combined with dietary and nutritional interventions on VD patients. In future research, we will conduct more in-depth and comprehensive research and analysis to address the limitations mentioned above, in order to provide more reliable references for clinical practice.

Conclusions

3R nursing combined with dietary and nutritional interventions can effectively improve the neurological function of VD patients, can improve their self-care ability, and can have a positive impact on their prognosis and health. In the future clinical treatment of VD, we recommended the use of 3R nursing combined with dietary and nutritional interventions. This has the potential to greatly improve the quality of modern medical services.

Availability of Data and Materials

The data used and/or analyzed during the current study are available from the corresponding author.

Author Contributions

JW designed the research study and provided help and advice on the experiments. BD analyzed the data. JW and BD performed the research. Both authors contributed to the drafting or important editorial changes in the manuscript. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study was approved by the ethics committee of the First Affiliated Hospital of Jinzhou Medical University (202311). This study was conducted in strict compliance with the Declaration of Helsinki and all subjects provided informed consent.

Acknowledgment

Not applicable.

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Conflict of Interest

The authors declare no conflict of interest.

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