The Effect of Humanistic Care in Post-Herpetic Neuralgia Patients after Implantation of Spinal Cord Electrical Stimulation

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Abstract

Objective: This study aimed to evaluate the effectiveness of the humanistic care (HC) following implantation of a spinal cord stimulator (SCS) in patients with postherpetic neuralgia (PHN).

Methods: Ninety-eight patients with PHN who underwent implantation of spinal cord electrical stimulation from August 2017 to November 2020 were included and randomly divided into control group (49 cases, routine care) and study group (49 cases, HC). The two groups were compared in terms of the healing of skin lesions, postoperative complications and nursing satisfaction. The changes in pain level, pain acceptance, psychological status and quality of life of patients before and after the intervention were also evaluated.

Results: The time to scar tissue formation , duration of regression of the skin lesions and time to no blistering eruption were shorter in the study group than in the control group ($P < 0.05$); The PRI, PPI, VAS and total score and HADS scores were lower in the study group than in the control group after the

intervention; CPAQ-8 and GQOL-74 scores were higher in study group than in the control group (P< 0.05); The study group had a lower complication rate (4.08%) and higher satisfaction rate with care (97.96%) than the control group (83.67%) (P< 0.05).

Conclusion: HC following implantation of spinal cord electrical stimulation in PHN patients could accelerate the healing of skin lesions, reduce the level of pain, regulate negative emotions, enhance pain acceptance, improve the quality of life, reduce complications, resulting in high patient satisfaction.

Keywords: postherpetic neuralgia; implantation of spinal cord electrical stimulation; humanistic care; pain level.

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Introduction

Herpes zoster is viral infection that occurs with reactivation of the varicella-zoster virus, typically characterized by painful rashes were associated with an involved nerve root and the idiosyncratic painful sensation [1, 2]. Postherpetic neuralgia (PHN) is a common complication of herpes zoster, with a prolonged and intractable course. Patients often present with chronic neuropathic pain such as throbbing pain, burning sensation, nociceptive pain, and intermittent pins-and-needles pain, which greatly affect the quality of sleep and life [3, 4]. Currently, minimally invasive procedures, analgesics, Chinese medicine treatment, and therapeutic nerve blocks are often implemented clinically for PHN, with varying efficacy. As a new method of neuromodulation, spinal cord stimulation (SCS) implants electrodes into the patient's spinal canal to affect the processing and conduction of pain in the spinal cord by pulsed current, which reduces the pain level and alleviates the condition without nerve damage [5]. However, SCS is an invasive operation, and patients will experience different degrees of psychological and physiological reactions, and are prone to postoperative complications such as electrode displacement and high current load. Therefore, standardized and humanized care should be performed during the perioperative period [6, 7].

Gillies, an American expert in nursing management, proposed that nursing management is the process of providing care, care and comfort to patients by nursing staff. Therefore, health care professionals should build a humanistic care (HC)-based medical system and explore the methods and connotations of HC [8]. Some scholars have proposed that the modern nursing model of HC is used in postoperative surgical analgesia, which can effectively alleviate the degree of pain, reduce the adverse experience and pacify the adverse emotions [9]. This study explored the HC for PHN patients based on understanding and respect towards patients in patient-centered manner, and observes the changes in pain level, pain acceptance, psychological status and quality of life of patients before and after SCS surgery, aiming to guide the development of clinical care.

Material and Methods

Clinical data

Ninety-eight patients with PHN who underwent spinal cord electrical stimulation in our hospital from August 2017 to November 2020 were selected, including 53 males and 45 females; aged 32-74 years, mean age of (62.6±5.9). Inclusion criteria: age ≧ 18 years; met the diagnostic criteria in the Chinese Expert Consensus on the Treatment of PHN [10]; duration ≧ 1 month; did not feel relieved by oral analgesics; Participants were informed about the study procedure and protocol and voluntarily signed the written informed consent. Exclusion criteria: previous history of opioid addiction, psychiatric disorders; communication disorders, dyslexia; comorbid systemic inflammatory diseases, malignancies, infectious diseases, bleeding disorders; tuberculosis, spinal fractures, myelitis, etc.; concomitant other diseases affecting neurological function. This study meets the requirements of the Declaration of Helsinki and has been approved by the Ethics Committee of Renmin Hospital of Wuhan University.

Methods

(1) Control group. Routine care was performed, including monitoring of patients' vital signs using cardiac monitors; preoperative education about disease-related knowledge; medication guidance; dietary guidance; medication guidance; one-day list printing and was present to patients symptomatic treatment, etc.

(2) Study group. HC was given 1) Establish a nursing team. A 10-member team consisting of the department director, chief physician, head nurse, and charge nurse was established, with the head nurse as the team leader, being responsible for training and meeting patients' needs. 2) Standardize service etiquette. Nursing staff are required to take the initiative to communicate with patients using polite language, always with a smile on their face; During all operations, they are required to close the door lightly, operating lightly, walking lightly, and talking lightly. (3) Improve early warning mechanism. The patient's condition, postoperative complications and prognosis were assessed in advance, and targeted emergency plans and preventive measures were formulated to handle emergency events. 4) Role-exchange. The group members did role-exchange exercises by playing nurses and patients in turn to personally feel the expectations, psychological needs and feelings of different identities and roles, to think from the patient's perspective, to tolerate patients and family members' overreaction; to patiently explain key points to patients and family members before and after each nursing session, to give them respect and care. 5) Implementation of nursing. ① Person-centered health education. According to the patient's condition and literacy, health education program was developed with the patient and family members, and the patient was encouraged to express their views on the content, measures, time and goals of health education; The health education on disease-related knowledge, pain management and diet, surgical treatment, adjuvant treatment, drug treatment, examinations, and precautions during hospitalization were demonstrated through displaying SCS operation environment, instruments used in the operation, and operation process, etc. ②Nurse-patient

communication. During hospitalization, the patient communicated with nurses for no less than 5 times, with each session lasting more than 10 min, covering the improvement of the patient's condition, the type of pain (agitated, integrated, paralyzed, non-agitated), the duration of pain, and sleep quality. For patients with adverse emotions such as anxiety and tension, relaxation training, behavioral therapy and suggestive therapy were implemented to relax their mood and help them build confidence. ③ Skin care. For patients with skin lesions in the lower thoracic segment, intensive perineal and urethral care should be performed to prevent infection; For the skin lesion area of the chest, topical tofenacin gel is applied externally and the wound is kept clean and dry. ④ Pain intervention. The visual analog scale (VAS) was used to assess the pain level of patients and develop targeted care measures, such as: VAS score ≦ 2: non-pharmacological pain care such as music therapy and attention diversion; VAS score ≦ 4: deep breathing exercises reduce the pain level and block the body's nociception; VAS score ≦ 6: Relaxation, deep breathing, warm compress, attention diversion for pain relief. Acupuncture at Wai Guan, Hegu, QuChi, etc. was performed once per day. Each session lasts 20 mins; Massage was performed 2 times per day, with 20 min for each session. The strength ranged from light to heavy, so that the patient feels numbness, soreness and swelling; VAS score>7: Gabapentin, Rebalin, fenbid, etc. for pain relief according to doctor's advice. If VAS score was >7, gabapentin, reserpine and fenbendazole were administered as prescribed, and the pain level was assessed regularly to ensure the effect of pain control. ⑤ Electrical stimulation management. Postoperatively, patient's feeling of spinal cord electrical stimulation was inquired to determining the intensity of electrical current, so that the efficacy could not be affected; If the cable dressing loosens, it needs to be treated in time to avoid the cable from dislodging. (6) Management of complications. The dressing should be changed regularly and kept clean and dry to prevent infection; If the patient shows symptoms of infection, such as wound inflammation and fever, symptomatic treatment should be given in time; If the patient shows low cranial pressure and fluid exudation at the wound, the risk of cerebrospinal fluid leak should be determined. (7) Discharge follow-up. Patients were given the brochure entitled "Standardized Treatment for Postherpetic Neuralgia" and informed of the follow-up plan, medication use and dietary precautions; Follow-up were made through home visits, Wechat, and telephone, so that patients could also receive care at home.

Outcome Measurement

(1) Healing of skin lesions. The time to scar tissue formation, duration of regression of the skin lesions and time to no blistering eruption were recorded in both groups.

(2) Pain level. Patients' pain levels before (upon admission) and after the intervention (1 month postoperatively) were assessed by the Simplified Mc Gill Pain Questionnaire (SF-MPQ) [11]: i) Visual analog scale (VAS) score. 0-10 represents no pain to severe pain, respectively; (ii) Pain Rating Index (PRI). It contains 4 subscales (sensory, affective, evaluative, and a miscellaneous category), scoring 0-3 which indicates no pain to severe pain, respectively; ③ Present Pain

Intensity (PPI) was scored from 1 to 5 , i.e., no pain to excruciating pain.

(3) Level of pain acceptance, psychological status. The Chinese version of the simple Chronic Pain Acceptance Questionnaire (CPAQ-8) [12] and the Hospital Anxiety and Depression Scale (HADS) [13] were used to assess patients' pain acceptance and negative mood before and after the intervention, respectively. The CPAQ-8 scale has two subscales: activity engagement (AE) and pain willingness (PW). Participants rate items on a scale from 0 (never true) to 6 (always true), with a total score of 0-48. Low scores indicated low pain acceptance; HADS scale includes anxiety (7 items) and depression (7 items), with a score of 0-3 for each item. Low scores indicated low levels of anxiety or depression.

(4) Quality of life. Patients' quality of life was evaluated using Generic Quality of Life Inventory-74 (GQOL-74) in terms of physical function, social function, psychological function, and somatic function, ranging 0-100. Low scores indicated low quality of life.

(5) Complications. Patients were observed for postoperative complications such as cerebrospinal fluid leak, infection, electrode displacement, and high-intensity current.

(6) Nursing satisfaction. Patients were given self-administered satisfaction questionnaire upon discharge, covering warning mechanism, service etiquette, health promotion, handling mechanisms, and communication skills, and was classified into 3 levels: satisfied, generally satisfied, and dissatisfied, with a Cronbach's α of 0.854 and a split-half reliability of 0.813.

Statistical Analysis

SPSS 24.0 was the analytic tool. The measurement data were expressed as $\bar{x} \pm s$, and the independent sample *t* and paired sample *t* tests were used for between-group and within-group comparisons, respectively. Count data were expressed using % and examined by χ^2 test; $P<0.05$ was considered a statistically significant difference.

Results

Baseline data

The baseline data of the study group was not significantly different from that of control group ($P> 0.05$), which shows that the two groups are comparable (**Table 1**).

HC and modern nursing mode help speed up the healing of patients' skin lesions

The time to scar tissue formation, duration of regression of the skin lesions and time to no blistering eruption were shorter in the study group than in the control group ($P< 0.05$), suggesting HC could accelerate the healing of lesions in patients with PHN (**Table 2**).

HC and modern nursing model reduce postoperative pain PRI, PPI, VAS and total score were reduced in both groups after the intervention ($P< 0.05$); PRI, PPI, VAS and total score were lower in the study group than in the control group after the intervention ($P< 0.05$), indicating HC can reduce the level of pain after implantation of spinal cord electrical stimulation in patients with PHN (**Figure 1**).

HC and modern nursing model increase the patient's acceptance of pain and improve the psychological stateCPAQ-8 scores increased and HADS scores decreased after the intervention in both groups ($P< 0.05$); CPAQ-8 scores were higher and HADS scores were lower in the study group than in the control group after the intervention ($P< 0.05$), demonstrating that the HC can enhance pain acceptance, improve psychological status and reduce negative emotions in patients with PHN (**Figure 2**).

HC and modern nursing model can improve the quality of life of patients The scores of GQOL-74 scale increased after the intervention in both groups ($P< 0.05$) and were higher in the study group than in the control group after the intervention ($P< 0.05$), indicating that HC could improve the quality of life and prognosis of patients with PHN (**Table 3**).

HC and modern nursing model reduce the incidence of postoperative complications The complication rate was lower in the study group (4.08%) than in the control group (16.33%) ($P< 0.05$), indicating that the HC can reduce the complication rate and accelerate the recovery process after implantation of spinal cord electrical stimulation in patients with PHN (**Table 4**).

HC and modern nursing model improve nursing satisfaction Nursing satisfaction rate was higher in the study group (97.96%) than in the control group (83.67%) ($P< 0.05$), indicating that HC is favored by patients with PHN and can enhance nursing satisfaction and reduce medical disputes (**Table 5**).

Discussion

Varicella-zoster virus is neurotropic alpha herpes virus with high affinity. It can become latent in semilunar and spinal ganglia for a long time after invading. Triggered by many factors, the virus replicates and revives again, affecting the patient's sensory nerves and their innervated skin, inducing varying degrees of neuralgia [14, 15]. Limb, medication and dietary guidance are carried out in routine care while support for patients' mental health and spirituality is neglected, so are their individualized care needs [16]. Therefore, the goal of nursing care should be to meet the individual needs of patients, nurse patients in terms of biological factors (genetic, biochemical, etc.), psychological factors (mood, personality, behavior, etc.) and social factors (cultural, familial, socioeconomic, medical, etc.), and implement comprehensive nursing services to achieve the best therapeutic effect.

With the establishment of the patient-centered biopsychosocial model, the core of care has shifted from being disease-centered to focusing more on the psychological, spiritual, emotional, and social aspects of the patient [17]. HC is a holistic nursing model with the goal of restoring patients' health status and meeting their physical and mental needs, which can make patients feel comfortable and convenient in the process of medical care, and ultimately achieve the purpose of improving patients' quality of life and health knowledge [18, 19]. Wu [20] found that HC can improve the quality of nursing work and improve the quality of life of patients. França [21] et al. reported that HC can promote nurse-patient communication, build mutual trust, and reduce

patients' pain levels. Zhang Xiao [22] et al. found that HC had a significant advantage in reducing negative emotions, improving quality of life, and reducing complications. In this study, compared to the control group, the study group had shorter skin lesion healing time, lower levels of pain, anxiety and depression, higher levels of pain acceptance and quality of life, satisfaction with care, and fewer complications, similar to the results of the above study, demonstrating the benefits of the HC. The reason is that in this model, system training and learning are performed to improve the knowledge level and operation skills of nursing staff, ensuring timely and accurate handling of problems; The early-warning work flow helps avoid potential risks, and reduces adverse events as well as the incidence of postoperative complications; Role exchange exercises will help nurses stand in patients' shoes, forgive and tolerate the patients or their families' overreaction, and reduce medical disputes; During health education before surgery, nurses establish a good professional image, ask patients about their illnesses with a sincere attitude, answer questions from the perspective of patients, try their best to meet the reasonable needs of patients, and make patients feel cared and respected [23]; In-depth communication between patients and nurses and goals set together can fully mobilize patients' enthusiasm and cooperation, fostering a environment of active nursing management. Patient-targeted health education can correct patients' misunderstandings about diseases and surgery, reduce their psychological burden, enhance self-care awareness and acceptance of pain; According to the VAS score, the targeted analgesic method was selected. Acupressure massage can promote blood circulation, inhibit nerve conduction excitement, improve the body's tolerance to pain, and regulate pain transmission pathways and local microcirculation and then exert an analgesic effect. Moraska [24] found that Acupressure massage can increase the pressure-pain threshold of the muscles and relieve the pain; Relaxation training can maintain the patient's mental and physical relaxation, reduce energy consumption, increase hemoglobin level and oxygen-carrying ability, increase oxygen saturation, thereby improve body function; Meanwhile, behavioral therapy, attention diversion and music therapy can distract patients from neuralgia, reduce pain sensitivity, and exert analgesic effect [25]; Moreover, home visits or follow-up through WeChat, telephone can help patients overcome the psychological barriers, improve sleep quality disturbed by pain, which not only enables patients to obtain seamless nursing services, guarantees the continuity of care, but also creates good conditions for patients' psychological and physical recovery and improve their quality of life.

However, there are still some shortcomings in this study, such as the single center, small sample size, and short period of follow up, which will be improved in future studies.

In conclusion, the HC in PHN patients implanted with spinal cord electrical stimulation could promote healing of skin lesion, reduce pain levels, regulate negative emotions, enhance pain acceptance, improve quality of life, reduce complications, leading to high patient satisfaction.

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Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

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Table 1 Comparison of baseline data between two groups (n/ $\bar{\chi}\pm S$)

Group	Male/female	Age (years)	Duration of herpes zoster (months)	Duration of neuralgia (months)	Area of pain	Literacy level
					Head and face / trunk / extremities	Junior high school and below/high school or junior college/college and above
Control group (n=49)	27/22	62.3±5.8	10.65±3.12	7.16±1.56	14/23/12	19/21/9
Study group (n=49)	26/23	63.7±6.2	11.16±4.02	7.26±2.03	16/20/13	20/24/5

Table 2 The influence of humanistic care and modern nursing mode on skin lesion healing ($\bar{\chi}\pm S$, d)

Group	The time to scar tissue formation	Duration of regression of the skin lesions	Time to no blistering eruption
Control group (n=49)	6.85±1.25	18.52±4.16	4.85±0.98
Study group (n=49)	5.46±1.02**	15.31±4.32***	2.94±0.75***

Note: Compared to the control group, **P< 0.01, ***P< 0.001

Table 3 The influence of humanistic care and modern nursing model on GQOL-74 scale score ($\bar{\chi}\pm S$, points)

Group	Psychological function		Somatic function		Physical function		Social function	
	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention	Pre-intervention	Post-intervention
Control group (n=49)	65.37±6.71	72.03±7.02###	62.26±5.16	68.29±5.54###	60.13±6.84	68.84±8.16###	70.16±8.03	76.68±8.17###
Study group (n=49)	66.45±5.97	81.16±8.13***###	63.34±5.94	73.39±6.19***###	61.15±6.95	78.95±9.13***###	71.25±7.15	86.13±7.84***###

Note: Compared to the control group, ***P< 0.001; compared within the same group before intervention, ###P< 0.001

Table 4 The influence of humanistic care and modern nursing mode on postoperative complications n (%)

Group	Cerebrospinal fluid leak	Infection	Displacement of electrodes	High strength current	Total occurrence
Control group (n=49)	2 (4.08)	1 (2.04)	3 (6.12)	2 (4.08)	8 (16.33)
Study group (n=49)	1 (2.04)	0	1 (2.04)	0	2 (4.08)*

Note: Compared to the control group, *P< 0.05

Table 5 The influence of humanistic care and modern nursing model on nursing satisfaction n (%)

Group	Satisfied	Generally Satisfied	unsatisfied	Total satisfaction
Control group (n=49)	20 (40.82)	21 (42.86)	8 (16.33)	41 (83.67)
Study group (n=49)	31 (63.27)	17 (34.69)	1 (11.11)	48 (97.96) *

Note: Compared to the control group,*P< 0.05

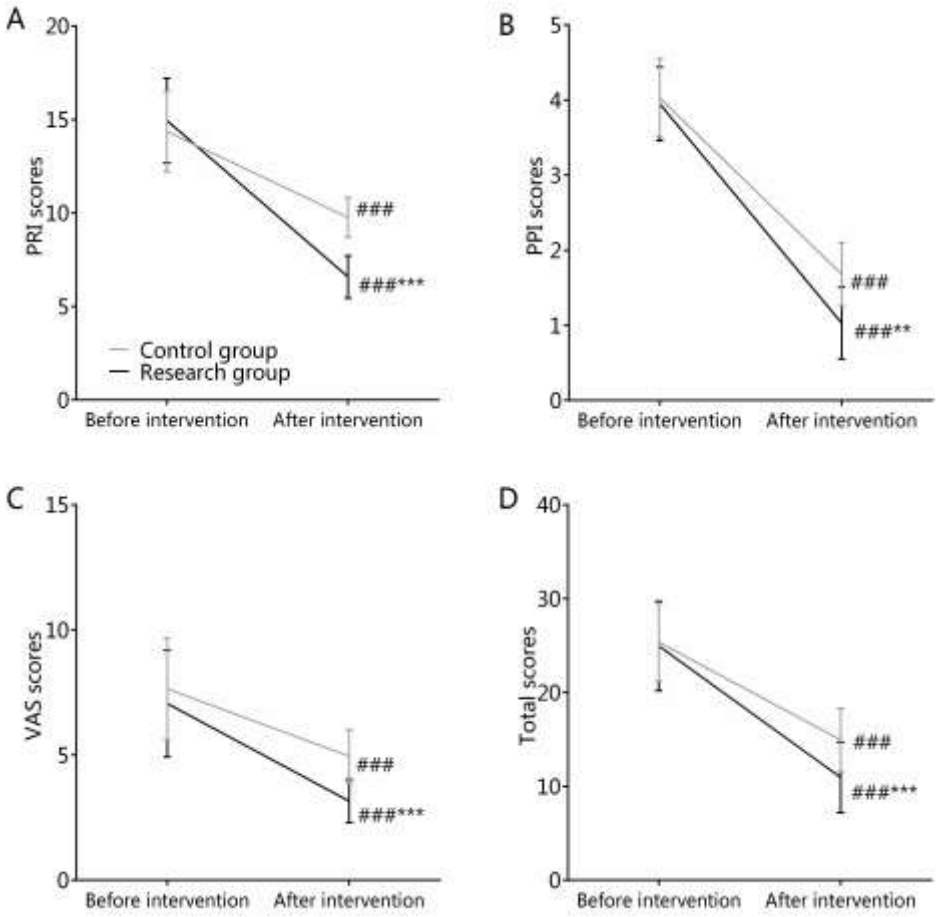

Figure 1 The influence of humanistic care and modern nursing model on the score of SF-MPQ questionnaire in patients with post-herpetic neuralgia

The SF-MPQ questionnaire was used to evaluate the patient's pain. The results show that the modern care model of humanistic care can reduce the postoperative pain of the patient. Note: A: PRI; B: PPI; C: VAS; D: total score. Compared with the control group, **P< 0.01, P< 0.001; compared with the pre-intervention within the same group, ###P< 0.001.

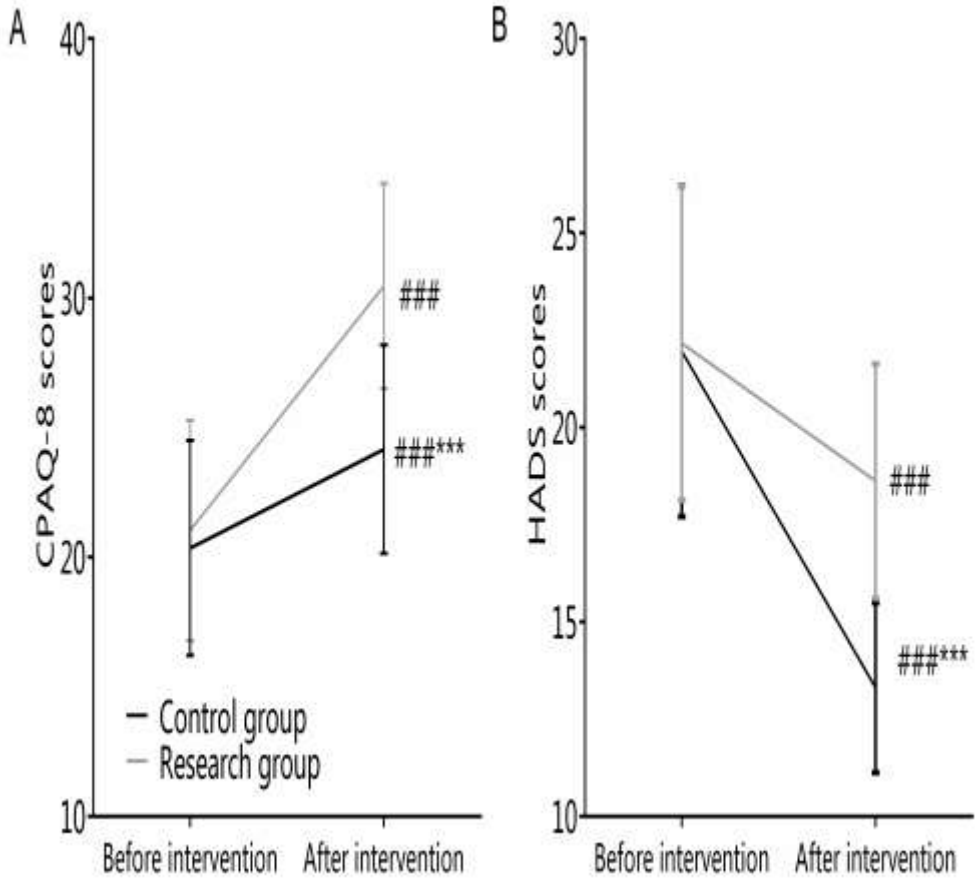

Figure 2 The influence of humanistic care and modern nursing model on CPAQ-8 and HADS scores of patients with post-herpetic neuralgia

The CPAQ-8 and HADS scores were used to evaluate the patient's pain acceptance and psychological state. The results show that the humanistic care modern nursing model can increase the pain acceptance of patients with post-herpetic neuralgia, improve their mental state, and reduce negative emotions. Note: A: CPAQ-8 score; B: HADS score. Compared to the control group, ***P< 0.001; compared to the pre-intervention within the same group, ###P< 0.001.