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Original Article

Effect of high-quality nursing intervention on psychological emotion, life quality and nursing satisfaction of patients with nasopharyngeal carcinoma undergoing radiotherapy

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Abstract: Objective: This study was designed to investigate the effect of high-quality nursing (HQN) intervention on psychological emotion, quality of life (QOL) and nursing satisfaction of patients with nasopharyngeal carcinoma (NPC) undergoing radiotherapy. Methods: Fifty-eight NPC patients receiving radiotherapy in our hospital between August 2017 and February 2019 were selected and divided into two groups according to different nursing intervention models. Among them, the control group (CG; 28 cases) was given routine nursing intervention, while the research group (RG; 30 cases) was treated with HQN intervention. The efficacy and the incidence of adverse reactions of the two groups were evaluated. Health knowledge awareness rate, psychological mood, QOL, sleep quality and nursing satisfaction were compared between CG and RG. Results: RG presented significantly higher efficacy and notably lower incidence of adverse reactions than CG after 3 months of nursing intervention. Patients in RG acquired evidently higher knowledge awareness rate regarding radiotherapy, dietary, adverse reaction prevention, self-care and functional exercise than those in RG ($P < 0.05$). In comparison with CG, the scores of Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) as well as Pittsburgh Sleep Quality Index (PSQI) in RG were evidently lower, while the Short-Form 36 Item Health Survey (SF-36) scores and nursing satisfaction were statistically higher. Conclusions: HQN intervention is high-performing in NPC patients undergoing radiotherapy, which can effectively improve the curative effect, reduce the incidence of adverse reactions, enhance patients' health knowledge awareness rate while relieving their bad emotions and improving their QOL, sleep quality and nursing satisfaction.

Keywords: High-quality nursing, nasopharyngeal carcinoma, radiotherapy, psychological mood, quality of life

Introduction

Nasopharyngeal carcinoma (NPC) is a common and highly malignant tumor of the head and neck, which mostly occurs on the top and side walls of the nasopharyngeal cavity, especially the pharyngeal recess, with the highest incidence among malignancies of the ear, pharynx and larynx [1]. Its pathogenic factors are various, mainly related to EB virus infection, genetic and environmental factors [2, 3]. The epidemiological investigation suggests that NPC shows obvious regional and ethnic differences, and has a certain tendency of family aggregation [4, 5]. NPC lesions can be nodular, ulcer and submucosal infiltration, with squamous cell carcinoma as the main pathological type [6]. The common clinical presentations are tinnitus, hearing loss, nasal congestion, blood stained nasal discharge, facial numbness, diplopia and headache, as well as other related symptoms such as neck lump and cranial nerve paralysis [7]. Clinically, the diagnosis is primarily made through nasopharyngoscopy, Epstein-Barr (EB) virus serologic examination, and imaging examination such as MRI and CT of nasopharynx and neck, as well as tissue biopsy [8, 9]. Given that NPC is moderately sensitive to radiotherapy, radiotherapy is the preferred treatment for NPC. Whereas, surgical resection and chemotherapy are also indispensable means for patients with higher differentiation cancer, late course of disease and recurrence after radiotherapy [10]. Radiotherapy for can-

cer is a local treatment method using radiation to treat tumors [11], which usually involves radioisotopes and X-rays generated α, β and γ rays, and other particle beams produced by electron beams, proton beams and various X-ray therapeutic machines or accelerators [12, 13]. Nowadays, radiotherapy plays an increasingly prominent role and has become one of the routines for the treatment of NPC [14]. Although radiotherapy has an ideal effect in NPC, it can seriously affect patients' physical and mental health and quality of life (QOL) due to its long course of treatment and the susceptibility to cause adverse reactions such as radiation damage [15, 16]. Therefore, scientific and effective nursing intervention for patients receiving radiotherapy is of vital clinical significance.

Today, with the transformation of medical pattern, the role of biological, social and psychological factors in the care of cancer patients has become increasingly prominent. In the meanwhile, there is a growing demand for care with the continuous improvement of people's living standards [17]. However, the traditional single biomedical model nursing intervention can no longer meet the requirements of modern nursing, which drive the mushrooming of new nursing models [18]. Of these, high-quality nursing (HQN) is patient-centered, which integrates the concept of humanistic care into nursing, and provides tailored premium care for patients according to their needs and disease characteristics, so as to make nursing services more humanized and better meet the needs of patients. Apart from that, HQN puts higher requirements for nursing staff, which on the other hand, can improve their professional ethics and professionalism, thus improving the quality of nursing services as a whole [19, 20]. Bhattacharyya S et al. [21] reported that HQN intervention during delivery could profoundly reduce the maternal mortality and the incidence of postpartum complications. However, there is currently little research on the application of HQN in NPC patients undergoing radiotherapy.

Herein, HQN model was given to NPC patients receiving radiotherapy, and its influence on psychological mood, QOL and nursing satisfaction of patients after radiotherapy was discussed.

Materials and methods

General information

From August 2017 to February 2019, 58 patients with NPC receiving radiotherapy in the Liaocheng people's Hospital were selected as the research subjects and divided into the control group (CG; 28 cases) for routine nursing intervention and the research group (RG; 30 cases) for HQN intervention. In CG, there were 20 males and 8 females, aged 28-74 years, with an average age of (55.62±10.86) years. In RG, there were 16 males and 14 females, aged from 35 to 81 years old, with an average of (56.93±10.02) years old.

Inclusion and exclusion criteria

Inclusion criteria: (1) All patients met the diagnostic criteria of NPC [22]; (2) All patients were in line with the indications of radiotherapy; (3) All patients received radiotherapy for more than one month; (4) All patients had complete clinical data; (5) This study was approved by the Ethics Committee of our hospital. All patients and their families were informed and signed the fully informed consent.

Exclusion criteria: (1) Patients with primary tumors in other parts; (2) Patients with radiation encephalopathy; (3) Patients with severe organic lesions such as heart, liver and kidney; (4) Patients with cognitive impairment, language or hearing impairment; (5) Patients with mental illness or family history of mental illness; (6) Patients who withdrew from the study.

Nursing methods

Patients in CG were given routine nursing intervention, mainly including measures such as health knowledge education, vital signs monitoring, reasonable diet plan guidance, and side effect nursing after radiotherapy.

On this basis, RG implemented HQN intervention, which covered a series of personalized nursing measures for patients before, during and after radiotherapy. The specific measures were as follows:

(1) Establishment of HQN nursing: In order to establish trust with patients, the first nurse who received patients introduced herself,

attending physician, head nurse and responsible nurse to patients and their families in detail, so as to have a detailed understanding of patients' condition and psychological status. By moving the nursing car to the bedside of the patient, the responsible nurse performed in-bed care to carry out morning and evening life nursing, so as to strengthen the daily comfort nursing and safety management of the patient, shorten the distance with the patient, and timely find and deal with the patient's nursing problems. In short, with thorough knowledge of the patient's condition, the nursing staff provided the patient with real-time comprehensive assessment, meticulous care', fully-implemented health education and considerate and targeted services to achieve high-efficiency nursing.

(2) Provision of comprehensive health education: First, the responsible nurse evaluated the knowledge deficiency, education level, acceptance and understanding ability of patients, as well as their disease awareness. Then, as appropriate, the responsible nurse utilized all kinds of methods such as explanation, teaching, pictures, written materials and video to explain to patients the outcome and recovery of the disease, as well as the anatomical characteristics and functions of nasopharynx, so that patients can understand how to cooperate with the treatment and nursing, thus reducing anxiety and increasing their' confidence in overcoming the disease.

(3) Provision of high-quality medical environment: The ward was kept at appropriate temperature and humidity, with sufficient lighting and fresh air circulation. In addition, the nursing staff served patients with a smile, dressed neatly and gracefully, behaved elegantly and gently, and spoke politely and appropriately. When communicating with patients, the nursing staff kept patient, amiable and approachable, and always maintain a positive and passionate state of mind in their work.

(4) Provision of targeted psychological care: The responsible nurse strengthened the communication with patients, established and maintained a good doctor-patient relationship, and understood the psychological status of patients timely and dynamically. In addition, targeted psychological counseling and education were carried out for patients, and successful cases of NPC after radiotherapy were introduced. Besides, information exchange between patients was encouraged, and positive evaluation and encouragement were given to patients during and after treatment to help them build confidence. At the same time, the nursing staff patiently and meticulously answered patients' questions, helped them relieve anxiety, and often held broad-based conversations with patients.

(5) Provision of comprehensive skin care: In addition to informing patients of the skin reaction that may occur during radiotherapy before radiotherapy, the responsible nurse attached importance to the protection of the patient's skin and advised them to wear open and loose cotton clothes, keep the skin clean in the irradiated field, pay attention to sun protection, do not scratch the skin with hands nor use alkaline and irritating toiletries. In addition, patients were instructed to use skin protective ointments or sprays simultaneously at the beginning of radiotherapy, and to treat skin damage according to the type of injury (dry/wet).

(6) Provision of comprehensive oral and nasal mucosa care: The responsible nurse instructed patients to brush their teeth with fluoride toothpaste and rinse with warm water in the morning and evening to keep the oral cavity clean. Meanwhile, the pH value of the patient's mouth was tested, and appropriate mouthwash was selected to relieve oral discomfort. For patients with worsening symptoms of oral pain, they were advised to use analgesics and topical anesthetic gargle as prescribed by the doctor to relieve the pain. They were also advised not to pick their nose with their hands or blow their nose vigorously even if they have nasal discomfort. Instead, they were instructed to apply an appropriate amount of peppermint oil for relief or wash their nasal cavity with normal saline. In addition, the nurses demonstrated mouth opening and neck turning training, informed the long-term harm of mouth opening difficulties, and urged the patients to keep exercising every day.

(7) Provision of comprehensive diet care: The responsible nurse guided patients to eat half-stream or soft food rich in protein, calorie and vitamin, instead of hot, sour, or rough food

stimulating ulcer surface. In addition, patients were reminded to eat less and more meals at a moderate speed to avoid pain caused by stimulation and injury of mucous membranes. Also, they were recommended to eat more foods rich in vitamin B in daily diet, such as soybeans, fish, eggs and mushrooms. What's more, scientific diet plans were developed for patients and help them develop good health eating habits.

(8) Provision of comprehensive care for myelosuppression: Patients with myelosuppression were routinely given leukocytopenia 24 hours after chemotherapy to prevent leukopenia. Those with leukopenia were informed to pay attention to personal hygiene and prevent colds. In addition, measures such as strict asepsis in medical operation, prevention of cross-infection, maintenance of good air quality in wards, and daily ultraviolet disinfection were carried out. Patient with thrombocytopenia were told to avoid injury, especially skin scratch, and stop toothpicks after meals to avoid accidents, as well as to regularly review blood routine.

Outcome measures

(1) Observation of curative effect and incidence of adverse reactions: According to the WHO evaluation standard of solid tumor [23], the curative effect was divided into the following four grades: complete response (CR), partial response (PR), stable disease (SD) and progressive disease (PD). CR: the tumor disappeared completely for more than 4 weeks; PR: the product of the maximum diameter and the maximum vertical diameter of the tumor decreased by 50%, while the other lesions did not increase, lasting for more than 4 weeks; PR: the product of two diameters of lesions decreased by no more than 50% and increased by no more than 25%, lasting for more than 4 weeks; Progressive disease: the product of two diameters of lesions increased by more than 25%. The total effective rate = (CR + PR) cases/total cases × 100%.

(2) Comparison of health knowledge awareness rate: The awareness rate of health knowledge, regarding radiotherapy, dietary, adverse reaction prevention, self-care, and functional exercise were compared between CG and RG.

(3) Comparison of psychological status: Self-rating Anxiety Scale (SAS) and Self-rating Depression Scale (SDS) [24] were utilized for anxiety and depression evaluation of patients before and after nursing intervention. The SAS has a total score of 100, with a score of 50-70 points indicating mild anxiety, 71-90 indicating moderate anxiety, and >90 indicating severe anxiety. The the score was in proportion to the severity of anxiety. The SDS has a total score of 100 points. A score of 50-70 indicated mild depression, a score of 71-90 indicates moderate depression, and a score >90 indicated severe depression. The higher the score, the severe the depression status.

(4) Comparison of QOL of patients. Short-Form 36 Item Health Survey (SF-36) [25] was employed for QOL assessment of patients in the two groups after nursing intervention. The scale includes eight items, including general health (GH), role-physical (RP), bodily pain (BP), vitality (VT), social functioning (SF), role-emotional (RE) and mental health (MH), with a score of 0-100 for each item. A higher score indicated a better QOL of the patient.

(5) Comparison of sleep quality: Pittsburgh Sleep Quality Index (PSQI) [26] was utilized to evaluate the sleep quality of patients. There are 7 components (each score 0-3 points) and 18 items in the scale, and the cumulative score is the total score of PSQI. On a point scale of 0-21, 0-5 was defined as good sleep quality, 6-10 as fair sleep quality, 11-15 as average sleep quality, and 16-21 as poor sleep quality.

(6) Comparison of nursing satisfaction: The nursing satisfaction of the two groups after nursing intervention was evaluated with the nursing satisfaction questionnaire made by our hospital. A total of 20 questions regarding the nursing contents they received in our hospital were scored, with 5 points for each question. A total score of less than 70 was considered as unsatisfied, 70-89 as satisfied, and ≥ 90 as very satisfied. Satisfaction = (very satisfied + satisfied) cases/total cases × 100%.

Statistical methods

SPSS24.0 (IBM Corp, Armonk, NY, USA) and GraphPad Prism 7 were remployed for statistical analysis and image rendering of the collected data, respectively. The counting data were represented by [n (%)], and the Chi-square test

Table 1. Comparison of general information between the two groups ([n (%)], x ± sd)

Classification	Research group (n=30)	Control group (n=28)	t/χ^2 value	*P* value
Gender			2.014	0.155
Male	16 (53.33)	20 (71.43)		
Female	14 (46.67)	8 (28.57)		
Age (years old)	56.93±10.02	55.62±10.86	0.477	0.634
BMI (kg/m^2)	24.47±3.62	24.31±3.42		
Pathological type			0.431	0.805
Undifferentiated non-keratinized squamous cell carcinoma	24 (80.00)	24 (85.71)		
Differentiated non-keratinized squamous cell carcinoma	5 (16.67)	3 (10.71)		
Keratinized squamous cell carcinoma	1 (3.33)	1 (3.58)		
Clinical staging			0.345	0.951
I	3 (10.00)	3 (10.71)		
II	6 (20.00)	5 (17.86)		
III	13 (43.33)	14 (50.00)		
IV	8 (26.67)	6 (21.43)		
Marital status			0.226	0.634
Married	26 (86.67)	23 (82.14)		
Single	4 (13.33)	5 (17.86)		
Residence			0.214	0.643
Urban	21 (70.00)	18 (64.29)		
Rural	9 (30.00)	10 (35.71)		
Ethnicity			0.043	0.835
Han	24 (80.00)	23 (82.14)		
Ethnic minorities	6 (20.00)	5 (17.86)		
Educational background			0.430	0.511
≥ High school	19 (63.33)	20 (71.43)		
< High school	11 (36.67)	8 (28.57)		
History of smoking			0.351	0.553
Yes	17 (56.67)	18 (64.29)		
No	13 (43.33)	10 (35.71)		
History of drinking			0.014	0.904
Yes	21 (70.00)	20 (71.43)		
No	9 (30.00)	8 (28.57)		
History of hypertension			0.837	0.360
Yes	12 (40.00)	8 (28.57)		
No	18 (60.00)	20 (71.43)		
History of diabetes			0.485	0.486
Yes	10 (33.33)	7 (25.00)		
No	20 (66.67)	21 (75.00)		

was used for comparison between groups. Continuity correction Chi-square test was applied when the theoretical frequency in Chi-square test was less than 5. The measurement data were described as mean ± standard deviation ($\bar{x}$ ± SD). The comparison between groups was done by independent sample T test, and the comparison before and after comparison within the same group was made by paired T test. Significance was set at a *p*-value of < 0.05.

Results

General information

General clinical baseline data such as gender, age, body mass index (BMI), pathological type,

Table 2. Comparison of total effective rate between the two groups [n (%)]

Groups	Complete response	Partial response	Stable disease	Progressive disease	Total effective rate (%)
Research group (n=30)	20 (66.67)	8 (26.66)	2 (6.67)	0 (0.00)	28 (93.33)
Control group (n=28)	9 (32.14)	10 (35.71)	7 (25.00)	2 (7.14)	19 (67.86)
χ^2	-	-	-	-	6.116
P	-	-	-	-	0.013

Table 3. Comparison of incidence of adverse reactions between the two groups [n (%)]

Groups	Oral mucosal reaction	Skin reaction	Nausea and vomiting	Leukocyte decline	Total incidence
Control group (n=28)	3 (10.71)	2 (7.15)	3 (10.71)	3 (10.71)	11 (39.28)
Research group (n=30)	1 (3.33)	2 (6.67)	1 (3.33)	0 (0.00)	4 (13.33)
χ^2	-	-	-		5.087
P	-	-	-		0.024

Table 4. Comparison of health knowledge awareness rate between the two groups [n (%)]

Groups	Radiotherapy knowledge	Dietary knowledge	Adverse reaction prevention knowledge	Self-care knowledge	Functional exercise knowledge
Control group (n=28)	20 (70.97)	20 (69.35)	18 (64.52)	17 (59.68)	18 (61.29)
Research group (n=30)	28 (94.64)	28 (94.64)	29 (98.21)	27 (92.86)	28 (94.64)
χ^2	4.870	4.870	9.881	6.783	7.447
P	0.027	0.027	0.001	0.009	0.006

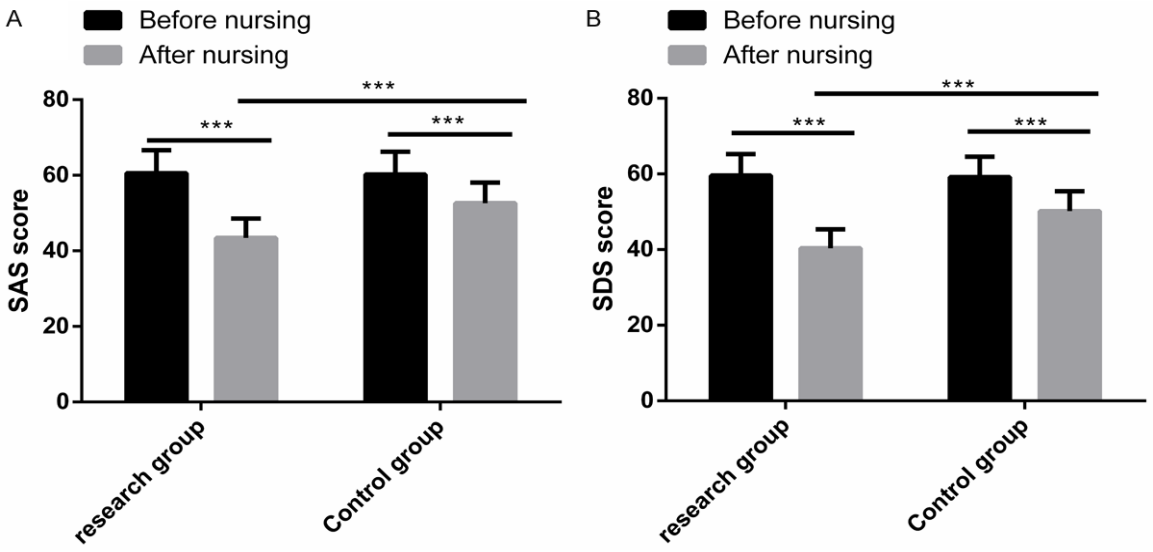

Figure 1. Comparison of SAS score and SDS score between the two groups. A: The SAS score decreased significantly in both groups after nursing intervention, and the score in the research group was significantly lower than that in the control group. B: The SDS score decreased significantly in both groups after nursing intervention, and the score in the research group was significantly lower than that in the control group. Note: ***indicates P < 0.001.

clinical staging, marriage, residence, ethnicity, educational background, smoking history, drinking history, hypertension history and diabetes history showed no significant difference between CG and RG (P>0.05) (**Table 1**).

Comparison of efficacy

The total effective rate was 92.85% in RG after nursing intervention, which was evidently higher than 75.81% in CG (P < 0.05) (**Table 2**).

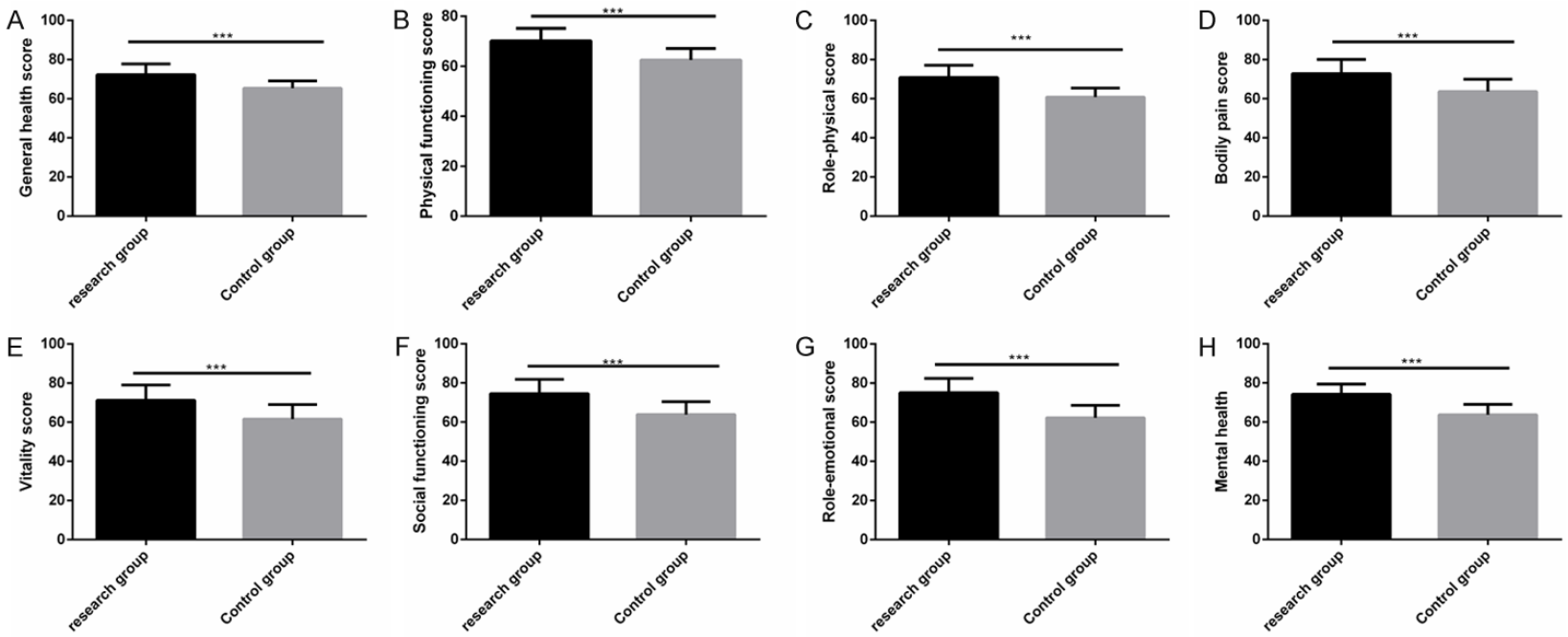

Figure 2. Comparison of quality of life between the two groups. A: The general health score of patients in the research group was significantly higher than that in the control group. B: The physical functioning score of patients in the research group was significantly higher than that in the control group. C: The role-physical score of patients in the research group was significantly higher than that in the control group. D: The bodily pain score of patients in in the research group was significantly higher than that in the control group. E: The vitality score of patients in the research group was significantly higher than that in the control group. F: The social functioning score of patients in the research group was significantly higher than that in the control group. G: The role-emotional score of the research group was significantly higher than that of the control group. H: The mental health score of patients in the research group was significantly higher than that in the control group. Note: ***indicates $P < 0.001$.

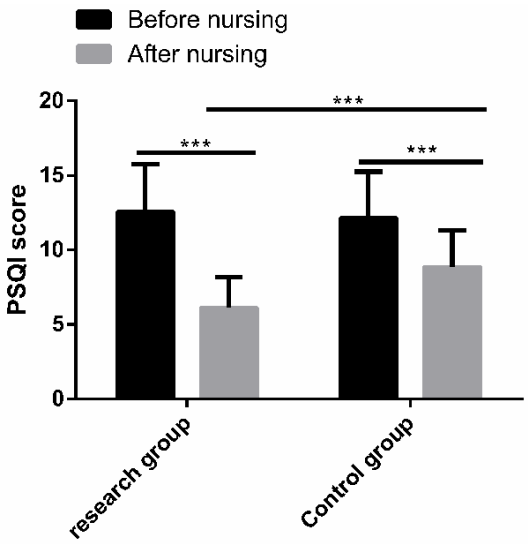

Figure 3. Comparison of PSQI scores between the two groups. After nursing intervention, the PSQI score of patients in the two groups decreased significantly, and the score in the research group were significantly lower than that in the control group. Note: ***indicates P < 0.001.

Comparison of incidence of adverse reactions

The incidence of adverse reactions was significantly lower in RG (16.07%) than in CG (43.55%) (P < 0.05) (**Table 3**).

Comparison of health knowledge awareness rate

In comparison with CG, the awareness rate of patients in RG on radiotherapy knowledge, dietary knowledge, adverse reaction prevention knowledge, self-care knowledge and functional exercise knowledge was statistically higher after nursing intervention (P < 0.05) (**Table 4**).

Comparison of SAS and SDS scores

Significant differences were absent between CG and RG regarding pre-nursing SAS score and SDS score (P>0.05). After nursing intervention, SAS score and SDS scores decreased statistically in both groups, and the reductions were more significant in RG (P < 0.05) (**Figure 1**).

Comparison of QOL scores

Compared with CG, the scores of QOL (GH, PF, RP, BP, VT, SF, RE and MH) were statistically higher in RG after nursing intervention (P < 0.05) (**Figure 2**).

Comparison of sleep quality scores

The PSQI score differed insignificantly between CG and RG before nursing intervention (P>0.05). However, the post-nursing PSQI score decreased notably in both groups, and the reductions were more obvious in RG (P < 0.05) (**Figure 3**).

Comparison of nursing satisfaction

The nursing satisfaction was 92.86% in RG and 69.35% in CG after nursing intervention, which indicated that patients in RG were more satisfied with HQN (**Table 5**).

Discussion

The rapid development of social economy contributes to the great changes in people's lifestyles and living environment, as well as the ever serious environmental pollution, which in turn drives the increasing incidence of NPC year by year [27]. NPC, a poorly differentiated cancer with a high lymphatic metastasis rate, mostly occurs in the nasopharynx where important nerves and blood vessels are distributed. Whereas, continuous mass resection is not suitable for primary lesions and cervical metastases, which limits surgical treatment. In contrast, NPC is sensitive to radiotherapy in most cases, so radiotherapy is the most effective and the first choice for NPC at present [28]. However, as radiotherapy processes and the frequency increases, patients will experience adverse reactions, which are detrimental to their' QOL to a certain extent. In addition to clinical effective treatment, clinical nursing is also an essential factor affecting the curative effect and prognosis of patients [29]. Therefore, we used HQN intervention for patients receiving radiotherapy to evaluate its impact on patients' QOL and adverse mood.

In the research of Luo S et al. [30], the implementation of humanistic care intervention for ophthalmic patients enormously improved nursing quality and nursing satisfaction. The core concept of HQN is also people-oriented, combined with the theory of humanistic care for nursing intervention. The results of this study exhibited that compared with CG, the

Table 5. Comparison of nursing satisfaction between the two groups [n (%)]

Classification	Research group (n=30)	Control group (n=28)	χ^2 value	*P* value
Very satisfied	22 (73.33)	8 (28.57)	-	-
Satisfied	6 (20.00)	11 (39.29)	-	-
Dissatisfied	2 (6.67)	9 (32.14)	-	-
Nursing satisfaction	28 (93.33)	19 (67.86)	6.116	0.013

total effective rate was statistically higher in RG, with a statistically lower incidence of adverse reactions after radiotherapy, indicating that HQN intervention can improve the clinical efficacy and reduce the adverse reactions of patients. In addition, the mastery of health knowledge can directly affect patients' confidence in disease treatment, and to a large extent, help improve treatment efficacy and patients' prognosis. Our results demonstrated that the health knowledge awareness rate of patients in RG on radiotherapy, dietary, adverse reaction prevention, self-care, and functional exercise was statistically higher than that in CG, indicating that HQN intervention can help patients obtain comprehensive health education, mobilize patients' subjective initiative, improve their health knowledge awareness rate and encourage their active practice of health behaviors. Furthermore, Ricard N et al. [31] argued that mental health intervention service was an indispensable part of HQN, and the psychological problems of patients intervened by HQN were profoundly mitigated and solved, which helped to improve the QOL of patients. In our research, it was found that the SAS and SDS scores were statistically lower in RG than in CG, indicating that comprehensive psychological intervention in HQN can evidently ease patients' adverse psychological mood such as anxiety and depression. Similar to ours, Hershman DL et al. [32] found that providing HQN to breast cancer patients enormously prolonged their survival, improved their QOL, and mitigated their adverse psychological mood. HQN is a combination of the core concept of people-oriented and modern psychosocial medicine model, which can timely solve all negative psychological problems of patients, thus improving 'their treatment confidence and efficacy, which is similar to the results of Ricard N et al. According to Kapoor DA et al. [33], the QOL and the nursing satisfaction of patients with prostate cancer were improved by implementing HQN intervention. Besides, Knops RR et al. [34] reported that HQN intervention was able to improve the therapeutic effect, survival rate and QOL of children with cancer. SF-36, a potent tool to comprehensively reflect patients' physical and mental health, was used to assess the QOL of patients in this study. We observed that the QOL scores in RG were statistically higher than those in CG regarding GH, PF, RP, BP, VT, SF, RE and MH, indicating that HQN intervention can statistically improve patients' QOL, which is in line with the research results of Kapoor DA et al. and Knops RR et al. What's more, Mo Y et al. [35] pointed out that NPC patients experienced dramatically declined sleep quality before and after radiotherapy, and a majority suffered from sleep disorders; however, routine nursing failed to improve their sleep quality, which seriously affected the QOL of patients. In addition, Mo YL et al. [36] found in their study that patients with NPC who received radiotherapy suffered from depression, anxiety and sleep disorders. PSQI, a common tool to measure the sleep quality of patients in the last month, reflects the QOL and treatment effect of patients indirectly. In this study, it was found that compared with CG, patients in RG presented remarkably lower PSQI scores and observably higher sleep quality, indicating that HQN intervention could remarkably meliorate the sleep disorder and improve the sleep quality of patients. Finally, we investigated the nursing satisfaction of patients, and found that the nursing satisfaction of patients in RG was statistically higher than that in CG, indicating that HQN intervention was more recognized by patients, which is similar to the research results of Luo S.

Although this study confirmed the favorable role of HQN intervention in the treatment of NPC patients undergoing radiotherapy, there is still room for improvement. For example, we can further follow up the long-term treatment effect and analyze the risk factors affecting the poor prognosis of NPC patients, thus improving the treatment efficacy. We will conduct supplementary studies from the above perspectives in the future to improve our research.

Conclusion

To sum up, while improving the overall efficacy and reducing the incidence of adverse reactions, HQN intervention for NPC patients undergoing radiotherapy can enhance their mastery of health knowledge, mitigate their anxiety and depression, and improve their QOL, sleep quality and nursing satisfaction.

Disclosure of conflict of interest

None.

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