

## STUDY ON INFLUENCING FACTORS AND NURSING INTERVENTION EFFECT OF SLEEP DISORDERS IN ESOPHAGEAL CANCER PATIENTS AFTER RADIOTHERAPY

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### ABSTRACT

**Objective:** The purpose was to study the influencing factors and nursing intervention effect of sleep disorders in esophageal cancer patients after radiotherapy.

**Methods:** 197 esophageal cancer patients treated with radiotherapy in the radiology department of The First Affiliated Hospital of Soochow University from July 2017 to July 2019 were selected as the study objects, and divided into sleep disorder group (n=100) and non-sleep disorder group (n=97) according to Athens Insomnia Scale (AIS) scores to analyze the influencing factors of sleep disorders and the effect of nursing intervention after radiotherapy.

**Results:** There were differences in payment methods, tumor staging, beliefs, pain and anxiety between the two groups of patients ( $P<0.05$ ). Multivariate retrospective analysis showed that tumor staging, pain and anxiety were the main influencing factors for sleep disorders in esophageal cancer patients after radiotherapy. VAS score, PSQI score and HAMA score of patients in sleep disorder group after intervention were significantly lower than those before intervention ( $P<0.001$ ). The somatic role, social function, activity, emotional role and total score of patients in sleep disorder group after intervention were significantly higher than those before intervention ( $P<0.001$ ).

**Conclusion:** Tumor staging, pain and anxiety are the main factors affecting sleep disorders in esophageal cancer patients after radiotherapy. Clinical nursing intervention can effectively improve the sleep quality of patients with sleep disorders, alleviate anxiety, and improve the life quality, with significant effect, which is worthy of promotion and application.

**Keywords:** Esophageal cancer, post-radiotherapy, sleep disorders, influencing factors, nursing intervention.

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### Introduction

Esophageal cancer is a gastroenterology tumor disease that originates in the esophagus<sup>(1-2)</sup>. Epidemiological studies have shown that<sup>(3)</sup> this tumor often occurs in middle-aged and elderly men, and the incidence is higher in rural areas than that in urban areas. The pathological type is mainly squamous cell carcinoma, and the middle esophagus is the common site of incidence. According to the latest survey data, the overall incidence of esophageal cancer ranks the sixth and the mortality rate ranks the fourth among all malignant tumors in China. Therefore, early

diagnosis and treatment has become a key measure to improve the prognosis and survival rate of patients<sup>(4)</sup>. Radiotherapy, an important part in the treatment of this disease, can effectively kill the diseased cells in patients and prevent further expansion and metastasis of cancer cells. However, this treatment has many side effects, which will damage normal cells and seriously affect the immune function of patients<sup>(5-7)</sup>. Sleep disorder is one of the common complications of esophageal cancer patients after radiotherapy. Sleep is an important part of human life activities and a nutritive factor to ensure the normal body development, which has the effect of protecting

brain function and improving autoimmunity. Long-term sleep disorder of patients will easily lead to neurasthenia and immunity decline, resulting in emotional fluctuations and even suicide in severe cases<sup>(8)</sup>. Therefore, it is of positive significance to pay attention to the sleep quality of esophageal cancer patients after radiotherapy, identify the influencing factors of sleep disorders, and provide effective clinical intervention to improve the life quality and the prognosis of esophageal cancer patients.

In order to further explore the influencing factors and nursing intervention effect of sleep disorders in esophageal cancer patients after radiotherapy, 197 esophageal cancer patients treated with radiotherapy in the radiology department of The First Affiliated Hospital of Soochow University from July 2017 to July 2019 were selected as the study objects, and divided into sleep disorder group (n=100) and non-sleep disorder group (n=97) according to AIS scores, summarized and reported as follows.

## Materials and methods

### General information

197 esophageal cancer patients treated with radiotherapy in the radiology department of The First Affiliated Hospital of Soochow University from July 2017 to July 2019 were selected as the study objects, and divided into sleep disorder group (n=100) and non-sleep disorder group (n=97) according to AIS scores.

#### Inclusion criteria:

- Compliance with the diagnostic criteria of esophageal cancer;
- Clear consciousness of patients with certain communication skills;
- AIS score of patients with sleep disorders ( $\geq 7$  points);
- This study was approved by the hospital ethics committee, and the patients and their families knew the purpose and process of this experimental study, and signed the informed consent.

#### Exclusion criteria:

- Patients with deteriorating conditions;
- Patients with organic lesions such as brain, heart and kidney;
- Patients with mental and other cognitive impairment, or refusal to cooperate with the experiment.

### Methods

The patient clinical data questionnaire designed by our hospital was used. The patients were informed

of the purpose and filling requirements of the survey, and then completed the survey with their consent. After completion, the researcher took back the questionnaires for further processing and verification. The questionnaires which were incomplete or not completed as required would be considered invalid.

Patients with sleep disorder received clinical nursing intervention. Nursing staff actively cared for and understood patients with gentle and slow nursing operations, avoiding patients' rest time as much as possible. A clean and comfortable ward environment for patients was created through maintenance of indoor hygiene, daily regular disinfection and ventilation of the ward, and maintenance of indoor temperature and humidity. Individualized work and rest plans were formulated according to patients' personal conditions, and analgesics and sedatives were used for patients with severe sleep disorders<sup>(9)</sup>. Family members were instructed to care for patients and massage their head and limbs before sleep to accelerate general blood circulation and promote sleep. Patients were informed to get along with each other, and loud talking was prohibited. Medical staff should communicate with patients to grasp their emotional changes at all times, listen carefully to their stories, conduct psychological evaluation, and conduct psychological counseling with psychological knowledge to alleviate their negative emotions.

Patients were encouraged to use attention transfer method, listening to music and other methods to rationally vent their negative emotions<sup>(10)</sup>. At the same time, family members or friends encouraged and supported patients to enhance their confidence in treatment and improve the sense of internal security. Medical staff actively informed patients of disease-related knowledge and listed successful cure cases to enhance patients' confidence in treatment. Medical staff evaluated the physical pain of patients every day, and administered drugs according to the three-level analgesic mode. Patients with mild pain should minimize the dosage of analgesics, patients with moderate pain should preferentially use oral analgesics, and patients with severe pain should use analgesic pumps to inject analgesics, prohibiting drug abuse. Patients were encouraged to face the disease and raise the pain valve. According to the patients' clinical condition and personal preferences, personalized dietary plan was formulated to encourage patients to eat more fresh fruits and vegetables following the dietary principle of multiple-meal-with-small-amount-for-

each, drink more juice, and keep their defecation unobstructed.

### Evaluation indexes

Visual Analogue Scale (VAS)<sup>(11)</sup> was used to evaluate the degree of body pain in patients with sleep disorders before and after intervention. The total score of the scale was 10 points, and the higher the score was, the stronger the degree of body pain in patients was.

Pittsburgh Sleep Quality Index (PSQI)<sup>(12)</sup> was used to evaluate the sleep quality of patients with sleep disorders before and after intervention. The total score of the scale was 15 points, and the higher the score was, the worse the sleep quality of patients was. The Chinese version of Hamilton Anxiety Scale (HAMA)<sup>(13)</sup> was used to evaluate the anxiety level of patients with sleep disorders before and after intervention. The total score of this scale was 64 points, including severe anxiety (score  $\geq 29$  points), obvious anxiety (score  $\geq 21$  points), existence of anxiety (score  $\geq 14$  points), possible anxiety (score  $\geq 7$  points) and normal (score  $< 7$  points). Short Form-36 Health Status Questionnaire(SF-36)<sup>(14)</sup> was used to evaluate the life quality of patients with sleep disorders before and after intervention. The scale included somatic role, social function, activity and emotional role. The total score of the first two items was 15 points separately, and the total score of the last two items were 20 points separately. The higher the score was, the higher the life quality of patients was.

### Statistical methods

The experimental data were statistically analyzed and processed by SPSS21.0 software. GraphPad Prism 6 (GraphPad Software, San Diego, USA) was used to draw pictures of the data. The count data were tested by  $X^2$ , expressed by  $n(\%)$ , and the measurement data were measured by t test, expressed by  $(\bar{x} \pm s)$ . Logistic regression was used to analyze the influencing factors of sleep disorders in esophageal cancer patients after radiotherapy. The difference was statistically significant when  $p < 0.05$ .

## Results

### Comparison of clinical data, pain degree and psychological status between the two groups of patients

There were differences in payment methods, tumor staging, beliefs, pain and anxiety between the two groups of patients ( $P < 0.05$ ), as shown in Table 1.

Category	Sleep disorder group (n=100)	Non-sleep disorder group (n=100)	$\chi^2/t$	P
Gender			0.000	0.987
Male	63 (63.00%)	61 (62.29%)		
Female	37 (37.00%)	36 (37.11%)		
Average age (years old)	55.32±4.52	55.34±4.54	0.031	0.975
BMI (kg/m <sup>2</sup> )	21.42±1.28	21.44±1.35	0.107	0.915
Smoking history			0.002	0.970
No	58 (58.00%)	56 (57.73%)		
Yes	42 (42.00%)	41 (42.27%)		
Drinking history			0.002	0.963
No	56 (56.00%)	54 (55.67%)		
Yes	44 (44.00%)	43 (44.33%)		
Marital status			0.151	0.698
Unmarried	4 (4.00%)	5 (5.15%)		
Married	96 (96.00%)	92 (94.85%)		
Educational level			0.138	0.710
High school and below	52 (52.00%)	53 (54.64%)		
Above high school	48 (48.00%)	44 (45.36%)		
Payment methods			4.535	0.033
Self-paying	28 (28.00%)	15 (15.46%)		
Medical insurance	72 (72.00%)	82 (84.54%)		
<b>Beliefs</b>				
Yes	7 (7.00%)	22 (22.68%)	9.644	0.002
No	93 (93.00%)	75 (77.32%)		
Tumor staging			5.342	0.021
Early stage	53 (53.00%)	67 (69.07%)		
Middle and late stage	47 (47.00%)	30 (30.93%)		
Diseasetypes				
Squamous cell carcinoma	37 (37.00%)	34 (35.05%)	0.081	0.776
Adenocarcinoma	32 (32.00%)	29 (29.90%)	0.102	0.750
Small cell carcinoma	18 (18.00%)	15 (15.46%)	0.227	0.634
Large cell carcinoma	13 (13.00%)	19 (19.59%)	1.571	0.210
Pain			3.934	0.047
Yes	83 (83.00%)	69 (71.13%)		
No	17 (17.00%)	28 (28.87%)		
<b>Anxiety</b>			4.105	0.043
Yes	89 (89.00%)	76 (78.35%)		
No	11 (11.00%)	21 (21.65%)		

**Table 1:** Comparison of clinical data, pain degree and psychological status between two groups of patients.

**Analysis on influencing factors of sleep disorders in esophageal cancer patients after radiotherapy**

Logistic regression analysis was carried out with sleep disorder as dependent variable, variables ( $P < 0.1$ ) in univariate analysis results including payment methods, tumor staging, anxiety and pain) and variables selected clinically (gender and disease types) as independent variables, as shown in Table 2.

Variables	Assignment
Gender	Female=0, male=1
Educational level	High school or below=0, above high school =1
Beliefs	No=0, yes=1
Payment methods	Self-paying=0, medical insurance=1
Tumor staging	Early stage=0, middle and late stage=1
Pain	No=0, yes=1
Anxiety	No=0, yes=1

**Table 2:** Variable assignment table.

**Multivariate regression analysis**

The study showed that pain, tumor staging and anxiety were the main influencing factors for sleep disorders in esophageal cancer patients after radiotherapy ( $P < 0.05$ ), as shown in Table 3.

Variables	$\beta$	SE	Wald $\chi^2$	P	OR	95% CL
Pain	1.162	0.425	7.432	0.007	3.205	(1.385, 7.394)
Tumor staging	1.393	0.497	7.992	0.004	4.032	(1.536, 10.613)
Anxiety	2.016	1.017	3.943	0.048	7.491	(1.027, 52.473)

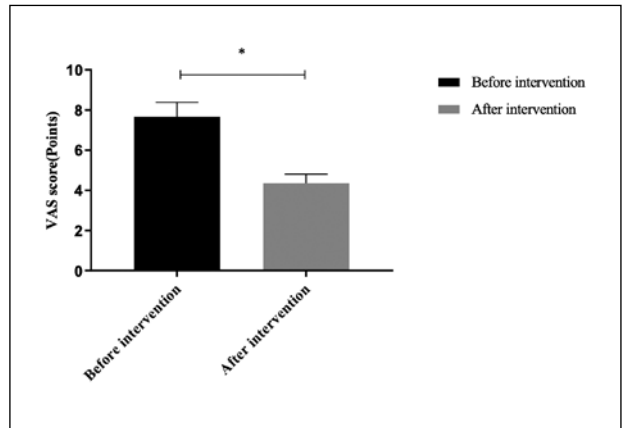
**Table 3:** Multivariate regression analysis.

**Comparison of VAS scores before and after intervention in the sleep disorder group**

The VAS score of patients in the sleep disorder group after intervention was significantly lower than that before intervention ( $P < 0.05$ ), as shown in Figure 1.

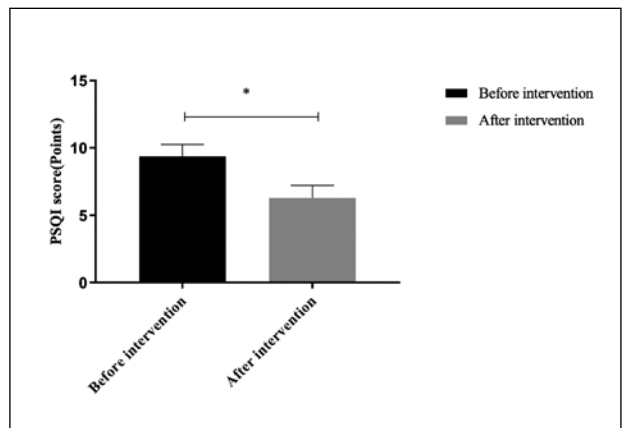
**Comparison of PSQI scores before and after intervention in patients with sleep disorders**

The PSQI score of patients after intervention was significantly lower than that before intervention ( $P < 0.05$ ), as shown in Figure 2.



**Figure 1:** Comparison of VAS scores before and after intervention in the sleep disorder group ( $\bar{x} \pm s$ ).

Note: The abscissa represents before intervention and after intervention, and the ordinate represents VAS score (points). The VAS score of patients was  $(7.15 \pm 1.02)$  points before intervention and  $(4.03 \pm 0.64)$  points after intervention. \*indicated that there was a significant difference in VAS scores of patients before and after intervention ( $t = 18.503, P = 0.000$ ).



**Figure 2:** Comparison of PSQI scores before and after intervention in patients with sleep disorders ( $\bar{x} \pm s$ ).

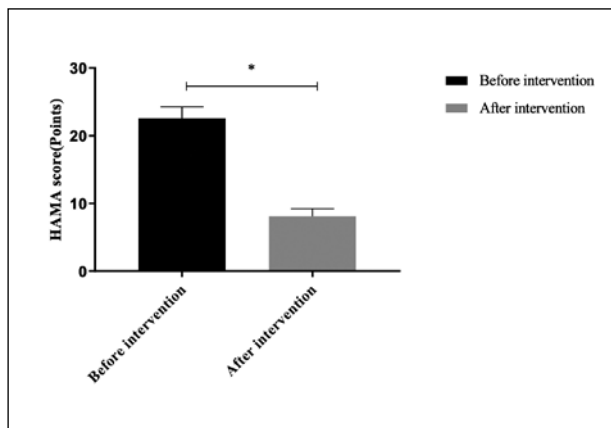
Note: The abscissa represents before intervention and after intervention, and the ordinate represents PSQI score (points). The PSQI score of patients was  $(8.74 \pm 1.26)$  points before intervention and  $(5.62 \pm 1.31)$  points after intervention. \*indicated that there was a significant difference in PSQI scores of patients before and after intervention ( $t = 17.165, P = 0.000$ ).

**Comparison of HAMA scores before and after intervention in patients with sleep disorders**

The HAMA score of patients after intervention was significantly lower than that before intervention ( $P < 0.05$ ), as shown in Figure 3.

**Comparison of SF-36 scores before and after intervention in patients with sleep disorders**

The somatic role, social function, activity, emotional role and total score of patients after intervention were significantly higher than those before intervention ( $P < 0.05$ ).



**Figure 3:** Comparison of HAMA scores before and after intervention in patients with sleep disorders ( $\bar{x} \pm s$ ).

Note: The abscissa represents before intervention and after intervention, and the ordinate represents HAMA score (points). The HAMA score of patients was  $(21.34 \pm 2.45)$  points before intervention and  $(7.35 \pm 1.54)$  points after intervention. \*indicated that there was a significant difference in HAMA scores of patients before and after intervention ( $t=48.345$ ,  $P=0.000$ ).

Time	n	Somatic role	Social function	Activity	Emotional role	Total score
Before intervention	100	5.32±1.52	6.28±1.34	9.84±2.15	8.32±2.63	29.76±7.64
After intervention	100	10.23±1.81	11.04±1.46	15.35±2.31	14.32±2.57	50.94±8.15
t		20.774	24.020	17.460	16.317	18.960
P		0.000	0.000	0.000	0.000	0.000

**Table 4:** Comparison of SF-36 scores of patients before and after intervention ( $\bar{x} \pm s$ , points).

## Discussion

At present, the main pathogenic mechanism of esophageal cancer has not been found in the medical field, presumably may be related to the patients' bad living habits such as eating too hot, mildew and coarse food, genetic factors and so on<sup>(15-17)</sup>. The clinical manifestations of the patients are correlated with the course of the disease. Some patients have choking and foreign body sensation behind the sternum when eating in the early stage, while those in the middle and late stage show progressive dysphagia, strong pain behind the sternum, and obvious weight loss.

Radiotherapy is a common treatment for esophageal cancer at present. Clinical investigation shows that about 35-40% of patients are completely cured after radiotherapy. Although this method can effectively kill cancer cells in patients, it will also cause damage to normal cells, and cause greater damage to the body with the increase of radiation.

Some scholars believe that human body has limited tolerance to radiation dose, and long-term radiation therapy will cause skin itching, erythema, insomnia and other symptoms, which reduces patients' confidence in treatment and affects the treatment effect to a certain extent<sup>(18-19)</sup>.

Sleep disorder is a common complication of esophageal cancer patients after radiotherapy. Long-term insufficient sleep will damage the immune function of patients, cause neurasthenia, aggravate the condition and affect the prognosis. This study analyzed the influencing factors of sleep disorders in esophageal cancer patients after radiotherapy with questionnaire survey, and found that tumor staging, pain and anxiety were the main factors affecting the sleep quality of patients. Due to the metastasis or expansion of cancer cells, and cancer tissue involving the whole esophagus or invading adjacent organs after penetrating the esophageal wall, patients in the middle and late stages will worry about the deterioration of the disease and have anxiety, affecting the sleep quality<sup>(20-21)</sup>.

In addition, some patients suffer from severe pain after radiotherapy due to their low pain valve and rely on analgesics to maintain sleep, resulting in decreased sleep quality. In order to explore the factors affecting the sleep quality of esophageal cancer patients, this study carried out clinical nursing interventions. By transferring attention, environmental intervention, psychological counseling and other methods, this study improved the sleep quality of patients, and improved patients' understanding of their own diseases, which enabled the patients to control their own emotions, face life and death, and maintain a positive and optimistic attitude. This study showed that the PSQI score of esophageal cancer patients with sleep disorders after nursing intervention was significantly lower than that before intervention ( $P < 0.001$ ). Els Visser et al.<sup>(22)</sup> pointed out that "After nursing intervention was carried out for lung cancer patients with sleep disorders, their PSQI score after intervention was  $(5.57 \pm 1.34)$  points, which was significantly lower than  $(8.86 \pm 1.54)$  points of the control group", indicating that nursing intervention can effectively improve the sleep quality of cancer patients. Clinical nursing intervention encourages patients to divert their attention through various ways, reasonably vent their negative emotions, and guides their families to massage patients' head and limbs before sleep, accelerating the general blood circulation and improve the life quality. In addition, due to the long treatment period and high treatment

cost of esophageal cancer, medical staff should communicate with family members more often. The family members are encouraged to support patients in life, spirit and other aspects, and cook food for patients according to their clinical manifestations and personal preferences to meet their nutritional needs, so that patients can feel at ease to receive clinical treatment<sup>(23-25)</sup>.

In conclusion, tumor staging, pain and anxiety are the main factors affecting sleep disorders in esophageal cancer patients after radiotherapy. Therefore, effective nursing intervention should be implemented according to patients' own condition to improve their sleep quality, alleviate anxiety and improve life quality, with significant effect, which is worthy of promotion and application.

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