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ORIGINAL RESEARCH

Analysis of the Present Status and Influencing Factors of Early Postoperative Kinesiophobia in Patients with Head and Neck Cancer: A Cross-Sectional Study

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Purpose: The purpose of this study was to investigate the status and influencing factors of kinesiophobia in patients during the early postoperative period following head and neck cancer (HNC) surgery.

Patients and Methods: This prospective cross-sectional study employed convenience sampling to recruit 367 patients undergoing radical head and neck surgery between September 1, 2024, and April 30, 2025. Participants were interviewed by trained researchers using a self-designed general information questionnaire, the Tampa Scale for Kinesiophobia-11 (TSK-11), the Chinese version of the Brief Fatigue Inventory (BFI-C), and the General Self-Efficacy Scale (GSES). Univariate analysis was performed using the chi-square test, Mann–Whitney *U*-test, or Fisher's exact test. Correlation analysis was conducted using Pearson's correlation coefficient. Multivariate analysis was conducted using multiple linear regression.

Results: The average score of kinesiophobia was 18.42 ± 4.97. The completion rate reached 98.65%. Males accounted for 51.77%, while females comprised 48.23%. Pearson correlation analysis demonstrated a significant positive correlation between TSK-11 and BFI-C scores in patients with HNC ($r = 0.801$, $p < 0.001$). TSK-11 scores were significantly negatively correlated with GESE scores ($r = -0.816$, $p < 0.001$). The results of the multiple linear regression analysis indicated that the included independent variables explained 82.1% of the variance in the dependent variable. Skin flap transplantation (t=7.996, 95% Cl 2.306–3.811, p<0.001), immobilization (t=6.483, 95% Cl 2.224–4.162, p<0.001), lymph node dissection (t=6.608, 95% Cl 1.540–2.845, p<0.001), tracheotomy (t=7.666, 95% Cl 1.749–2.956, p<0.001), GESE (t=−3.406, 95% Cl −0.229–0.061, p<0.001), and BFI-C (t=3.028, 95% Cl 0.169–0.795, p<0.001) were significant influencing factors for kinesiophobia in patients during the early postoperative period following HNC surgery.

Conclusion: The proportion of head and neck cancer patients experiencing kinesiophobia in the early postoperative period is relatively high. Research has demonstrated that this phenomenon is closely associated with self-efficacy, fatigue levels, and the type of surgical procedure. Therefore, it is recommended that healthcare professionals should consider kinesiophobia as a core indicator in postoperative rehabilitation assessments, with particular attention to patients undergoing complex surgery or exhibiting low self-efficacy and high fatigue levels. Early identification of high-risk individuals and the implementation of multidimensional intervention strategies—including enhancing self-efficacy through cognitive behavioral therapy, implementing stepwise fatigue management programmes, and providing personalized rehabilitation guidance for patients undergoing specific surgeries—will ultimately reduce the incidence of kinesiophobia.

Keywords: head and neck cancer, kinesiophobia, self-efficacy, fatigue, influencing factors

Introduction

Head and neck cancer (HNC) is ranked as the seventh most prevalent cancer globally and represents one of the most commonly encountered clinical malignancies. In 2022, it is estimated that there will be over 890,000 new cases and more than 450,000 deaths, accounting for 4.7% of global cancer-related mortalities. Each year, approximately 130,000 new cases of head and neck malignancies are reported in China, comprising 3–6% of all systemic malignancies.[1] The median

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age at diagnosis is approximately 60; however, the incidence of these cancers in adults under 45 has been increasing in recent years.[2] Between 2018 and 2030, HNC is projected to result in a cumulative global loss of approximately 535 billion US dollars in economic output, with a more pronounced impact on developing countries.[3]

At the time of initial diagnosis, more than 40% of patients presented with regional lymph node metastases (stage IVA or B), while approximately 10% exhibited distant metastases (stage IVC).[4] Depending on the TNM stage and primary site, a range of combination therapies may be employed, such as surgery, radiotherapy, and chemotherapy. Surgery remains a critical component in the comprehensive management of HNC. Neck dissection continues to be the standard treatment for palpable or occult cervical metastases originating from HNC. Some patients with HNC undergo salvage surgery following extensive defect areas or failure of radiotherapy and chemotherapy. Extensive defects typically necessitate reconstruction using free tissue flaps to optimize postoperative function and appearance.[5] However, surgery may lead to a high incidence of infections and fistulae, and complications such as facial oedema and swelling are more likely to occur, especially when both internal jugular veins are ligated concurrently. It may also result in traction or injury to the spinal accessory nerve, thereby restricting neck and shoulder movement and potentially causing complications such as upper limb pain.[6]

A growing body of evidence underscores the essential role of postoperative physical activity and functional exercise in minimizing postoperative complications, specifically by enhancing functional capacity, improving quality of life, and reducing fatigue.[7] However, a significant clinical challenge remains: poor patient compliance, which may be partially attributed to kinesiophobia. Back also reported that kinesiophobia significantly hinders patients' participation in exercise rehabilitation, leading to insufficient exercise levels and decreased compliance, which may substantially affect rehabilitation outcomes.[8] Research indicates that individuals with kinesiophobia not only exhibit greater dependency, slower gait velocity, and poorer knee extension capacity during lower limb functional recovery, but this fear also directly impedes essential mandibular movement and coordinated training of the swallowing muscle groups during head and neck rehabilitation. Consequently, it significantly delays the restoration of swallowing and speech functions.[9,10] Kinesiophobia refers to the fear and anxiety associated with movement and activity, often stemming from a perceived vulnerability or susceptibility to injury.[11] It is a specific psychological phenomenon characterized by excessive fear.[12] Due to the presence of kinesiophobia, individuals may choose to limit or avoid functional exercise rather than gradually increasing it.

Previous studies have examined various conditions, including joint pain,[13] joint replacement,[14] heart disease,[15] and breast cancer,[16] and identified age, chronic pain, mindfulness, anxiety, and depression as significant factors influencing kinesiophobia. However, limited research has been conducted on the extent of postoperative kinesiophobia in patients with HNC and the key factors influencing it. Therefore, the aim of this study is to investigate the current status of postoperative kinesiophobia in patients with HNC, analyze its influencing factors.

Materials and Methods

Study Design and Setting

This is a single-center prospective cross-sectional study designed to investigate the status and influencing factors of postoperative kinesiophobia in patients with HNC. The study was conducted between September 2024 and April 2025 in the outpatient clinics and wards of the Department of Head and Neck Surgery and Thyroid Surgery at Zhejiang Cancer Hospital. This prospective observational study followed the guidelines outlined in "Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)".[17] The study was registered on the Chinese Clinical Trial Registry (https://www.chictr.org.cn) under the registration number ChiCTR2400088579.

Participants

The inclusion criteria for patients were as follows: (1) an initial diagnosis of head and neck squamous cell carcinoma confirmed by histopathology; (2) scheduled to undergo radical head and neck surgery; (3) aged between 18 and 80 years; (4) conscious and capable of cooperating with the examination; (5) signed the informed consent form and voluntarily participated in the study. The exclusion criteria were as follows: (1) presence of other malignant tumors or systemic diseases; (2) severe mental disorders or speech impairments.

Study Size

Sample size calculation: According to Kendall's empirical method,[18] it is generally recommended that the sample size should be 5–10 times the number of research factors in multivariate analysis. In this study, there were 31 influencing factors of self-management behavior in patients with recurrent gout. Considering a 20% rate of invalid samples, the total required sample size was estimated to range between 186 and 372 cases, with 367 cases ultimately included in this study.

Instruments

Patient General Information Questionnaire

The questionnaire was specifically designed by the researchers through a comprehensive literature review, encompassing both socio-demographic and disease-related information. Socio-demographic data include gender, age, and educational background, while disease-related variables include skin flap transplantation, lymph node dissection, tracheotomy, and other relevant factors.

Tampa Kinesiophobia-11 Scale

The Tampa Scale of Kinesiophobia-11 was utilized to assess kinesiophobia. The original scale was developed by Kori et al,[18] and the Chinese version was translated and validated by Cai.[19] The TSK-11 comprises three dimensions and 11 items, including somatic focus (6 items), activity avoidance (3 items), and avoidance beliefs (2 items). Each item is rated on a 4-point Likert scale ranging from 1 to 4, with total scores ranging from 11 to 44 points. A total score of 17 or higher indicates the presence of kinesiophobia, where higher scores reflect greater severity of kinesiophobia. The Cronbach's α coefficient for this scale is 0.883, indicating good internal consistency.[19]

The Chinese Version of the Brief Fatigue Inventory

The Brief Fatigue Inventory was developed to measure fatigue in individuals with cancer. The BFI-C was introduced and validated in China by Wang et al.[20] The Cronbach's alpha coefficient for the scale is 0.944, indicating excellent internal consistency. The Cronbach's alpha coefficients for the nine items range from 0.929 to 0.944.[20] Patients complete nine assessment items on this scale. The BFI-C consists of a two-part evaluation: the first part assesses fatigue severity, including current fatigue severity as well as usual and worst fatigue severity experienced in the past 24 hours. The second part evaluates the impact of fatigue symptoms on patients' daily life activities over the last 24 hours using six specific items: general activity, mood, walking ability, normal work (including both external employment and housework), relationships with others, and enjoyment of life. Each item is rated on an 11-point numeric rating scale (0 to 10), where higher scores indicate greater fatigue severity and impact.

General Self-Efficacy Scale

The scale was originally developed in German in 1981 by Professor Ralf Schwarzer at the Free University of Berlin, Germany.[21] The original version of the GSES included 20 items, but after simplification, it now consists of 10 items. The scale has since been translated into at least 25 languages and is widely used globally. The GSES is scored on a 4-point Likert scale, with respondents selecting one of the four options: "completely incorrect," "slightly correct," "moderately correct," or "exactly correct" based on their actual situation. These options are scored as follows: 1 for "completely incorrect," 2 for "slightly correct," 3 for "moderately correct," and 4 for "exactly correct." Higher total scores indicate a stronger sense of self-efficacy. In this study, the Cronbach's α coefficient for the GSES was 0.89, indicating excellent internal consistency.[22]

Data Sources/Measurement

Researchers visited the patient on the tenth day post-surgery to explain the purpose and significance of the study, along with the anticipated time commitment required. After obtaining informed consent from the patients, researchers conducted a face-to-face questionnaire survey. Upon completion of the questionnaire, research nurses collected the forms and verified their completeness and accuracy to ensure data quality.

Ethical Considerations

This study protocol was reviewed and unanimously approved by the Institutional Review Board of Zhejiang Cancer Hospital (approval no. 2024–42) on January 8, 2024. The study was conducted in accordance with the principles of the Declaration of Helsinki (as revised in 2013). Written informed consent was obtained from each participant before the commencement of the study. All protected healthcare information was used solely for research purposes and securely safeguarded throughout the study.

Statistical Analysis

SPSS for Windows (version 26; IBM) was used for data analysis. The fitness of the data to normal distribution was evaluated using the Kolmogorov–Smirnov test. Quantitative data conforming to a normal distribution are presented as mean ± SD, whereas non-normally distributed data are presented as median or quartile. Categorical data are summarized as frequency and percentage. Univariate analysis was performed using the chi-square test, Mann–Whitney *U*-test, or Fisher's exact test. Correlation analysis was conducted using Pearson's correlation coefficient. Variables with $p < 0.05$ in univariate analysis and correlation analysis were selected as independent variables, and multivariate analysis was conducted using multiple linear regression methods. Significant differences were identified at the 0.05 level ($P < 0.05$).

Results

Participant Characteristics and Differences Based on Kinesiophobia

This study included 372 participants, of whom 367 effectively completed the questionnaire survey, yielding a completion rate of 98.65%. Of these participants, 51.77% were men. Additional general information is summarized in Table 1. The univariate analysis indicated that the degree of kinesiophobia in patients shortly after HNC surgery varied significantly across various factors, including education level ($F=5.975$, $p=0.003$), skin flap transplantation ($F=13.883$, $p<0.001$), immobilization ($F=25.197$, $p<0.001$), lymph node dissection ($F=7.667$, $p<0.001$), and tracheotomy ($F=11.568$, $p<0.001$). The detailed findings are summarized in Table 1.

Scores of the TSK-11 in Early Postoperative Patients with HNC

In the present study, the total kinesiophobia score among 367 patients with HNC was 18.42 ± 4.97, with an average item score of 1.67 ± 0.45. The highest mean score was observed in the Attitude dimension, which averaged 1.81 ± 0.60, thereby ranking it first. The Cognition dimension had the second highest mean score of 1.70 ± 0.49. The Activity dimension exhibited the lowest mean score of all dimensions at 1.52 ± 0.53, placing it in third position. For detailed information, please refer to Table 2.

Correlation Among TSK-11, BFI-C, and GESE in Early Postoperative Patients with HNC

The BFI-C consisted of 9 items, yielding a total score of 35.83 ± 12.76 and an average item score of 3.98 ± 1.42. The GESE included 10 items, resulting in a total score of 26.81 ± 5.08 and an average item score of 2.68 ± 0.51. Pearson correlation analysis demonstrated a significant positive correlation between TSK-11 and BFI-C scores in patients with HNC ($r = 0.801$, $p < 0.001$). Furthermore, TSK-11 scores were significantly negatively correlated with GESE scores ($r = -0.816$, $p < 0.001$). For more details, please refer to Table 3.

Multiple Linear Regression Analysis of Influencing Factors of Kinesiophobia in Early Postoperative Patients with HNC

The statistically significant variables identified in both univariate and correlation analyses were selected as independent variables. To meet the requirements of multiple linear regression, dummy variables were created for categorical variables (see supplementary Table 1), and the total kinesiophobia score was used as the dependent variable to construct the regression equation. The results show that the VIF value for each variable is less than 5, indicating that no multicollinearity exists among the variables.[24] The results of the multiple linear regression analysis indicated that the included

Table 1 General Characteristics of HNC Surgery Patients and Associated Factors Influencing Kinesiophobia (n = 367)

Variables	N (%)	Mean ± SD	t/F	p-value
Sex			0.751[a]	0.453
Male	190 (51.77)	18.23±4.85		
Female	177 (48.23)	18.62±5.09		
Age (year)			1.656[b]	0.192
18-45	107 (29.16)	18.73±3.93		
45~59	92 (25.07)	18.98±5.43		
≥60	168 (45.77)	17.92±5.27		
BMI (kg/m^2)			0.239[b]	0.787
<18.5	131 (35.69)	18.41±4.89		
18.5~<25	234 (63.77)	18.44±5.04		
≥25	2 (0.54)	16.00±1.41		
Educational level			5.975[b]	0.003
Primary school and below	126 (34.33)	19.37±6.31		
High school	119 (32.43)	18.61±4.86		
University and above	122 (33.24)	17.25±2.83		
Medical insurance payment			0.95[a]	0.343
Yes	284 (77.38)	18.55±4.96		
No	83 (22.62)	17.96±5.00		
Skin flap transplantation			13.883[b]	<0.001
Yes	144 (39.24)	22.05±5.41		
No	223 (60.76)	16.08±2.78		
Immobilization			25.197[a]	<0.001
Yes	77 (20.98)	26.09±4.29		
No	290 (79.02)	16.38±2.56		
Lymph node dissection			7.667[a]	<0.001
Unilateral	132 (35.97)	15.95±2.70		
Both sides	235 (64.03)	19.80±5.40		
Tracheotomy			11.568[a]	<0.001
Yes	177 (48.23)	21.08±5.65		
No	190 (51.77)	15.94±2.29		

Notes: a: *t*-test; b: Variance. BMI classification according to the WHO standards: https://www.who.int/data/gho/data/themes/topics/topic-details/GHO/body-mass-index?introPage=intro_3.html.[23]
Abbreviations: HNC, Head and neck cancer; BMI, body mass index.

Table 2 Scores of the TSK-11 in Early Postoperative Patients with HNC

Variables	Items	Max Value	Min Value	Score (Mean ± SD)	Average Score Per Item (Mean ± SD)
Total	11	44	11	18.42±4.97	1.67±0.45
Attitude	2	8	2	3.62±1.20	1.81±0.60
Cognition	6	24	6	10.22±2.94	1.70±0.49
Activity	3	12	3	4.58±1.58	1.52±0.53

Abbreviation: TSK-11, Tampa kinesiophobia-11 scale.

independent variables explained 82.1% of the variance in the dependent variable. Among these, skin flap transplantation (t=7.996, 95% Cl 2.306–3.811, p<0.001), immobilization (t=6.483, 95% Cl 2.224–4.162, p<0.001), lymph node dissection (t=6.608, 95% Cl 1.540–2.845, p<0.001), tracheotomy (t=7.666, 95% Cl 1.749–2.956, p<0.001), GESE (t=−3.406, 95% Cl −0.229–0.061, p<0.001), and BFI-C (t=3.028, 95% Cl 0.169–0.795, p<0.001) were identified as significant influencing factors of kinesiophobia among early postoperative patients with HNC. The specific results of the multiple linear regression analysis are presented in Table 4.

Table 3 Results of Correlation Analysis

Variables	TSK-11	Attitude	Cognition	Activity
BFI-C	0.801**	0.580**	0.822**	0.548**
GESE	−0.816**	−0.570**	−0.796**	−0.654**

Notes: **P<0.001.
Abbreviations: TSK-11, Tampa kinesiophobia-11 scale; BFI-C, The Chinese Version of the Brief Fatigue Inventory; GESE, General Self-Efficacy Scale.

Table 4 Results of Multiple Linear Regression Analysis of Kinesiophobia in Early Postoperative Patients with HNC (N=367)

	Non Standardized Coefficient		Coefficient of Standardization	t	p	95% CI
	B	SD	Beta			
Constant	16.367	1.567		10.444	<0.001	(13.285,19.449)
Tracheotomy	2.352	0.307	0.237	7.666	<0.001	(1.749,2.956)
Skin flap transplantation	3.059	0.383	0.301	7.996	<0.001	(2.306,3.811)
Immobilization	3.193	0.493	0.262	6.483	<0.001	(2.224,4.162)
Lymph node dissection	2.192	0.332	0.212	6.608	<0.001	(1.540,2.845)
GESE	−0.145	0.043	−0.149	−3.406	<0.001	(−0.229, −0.061)
BFI-C	0.482	0.159	0.138	3.028	0.003	(0.169,0.795)
Educational level	−0.193	0.14	−0.032	−1.377	0.169	(−0.469,0.083)

Notes: R^2=0.825, Adjusted R^2=0.821, F=241.109, P<0.001.
Abbreviations: BFI-C, The Chinese Version of the Brief Fatigue Inventory; GESE, General Self-Efficacy Scale.

Discussion

Status of Kinesiophobia in Early Postoperative Patients with HNC

This study aimed to investigate the prevalence of early postoperative kinesiophobia among head and neck cancer patients and its associated factors. Our findings indicate a high incidence of early postoperative kinesiophobia in HNC patients (53.95%), with its severity closely correlated with specific surgical factors (skin flap transplantation, immobilization, lymph node dissection, tracheotomy) and patients' psychophysiological states (self-efficacy, fatigue).

The study found that the mean score for early postoperative kinesiophobia among HNC patients was 18.42 ± 4.97. Based on the TSK-11 threshold (≥17 points), a substantial proportion of patients exhibited kinesiophobia. This finding aligns with observations from clinical practice and warrants greater attention from healthcare professionals. Studies have shown that kinesiophobia is caused by persistent physical pain, which triggers anxiety and subsequently increases the patient's sensitivity to pain and subjective reluctance to movement.[25] Faced with changes in self-image following surgery, patients are prone to psychological disturbances such as anxiety and avoidance behaviors. At the same time, they must endure physical pain, which can lead to excessive fear, decreased pain tolerance, and concerns that physical activity may result in reinjury. In addition, the severity of the disease and the postoperative pain may make it difficult for patients to confront the changes resulting from surgery, leading them to avoid rehabilitation exercises and consequently experience a higher level of kinesiophobia. Research indicates that motion phobia hinders early functional recovery in patients.[26] Trocoli's study on kinesiophobia in patients with low back pain demonstrated that kinesiophobia can predict the extent of individual disability, and individuals with high levels of kinesiophobia are at a greater risk of developing physical disabilities.[27] Therefore, it is recommended that healthcare professionals promptly assess postoperative exercise kinesiophobia. At the professional level, a multidisciplinary team should be assembled to implement systematic interventions, such as cognitive behavioral therapy, to correct patients' maladaptive beliefs. Furthermore, it is essential to develop structured and evidence-based intervention plans to enhance patients' adherence to rehabilitation, thereby improving their postoperative quality of life, reducing the risk of recurrence, and facilitating their reintegration into family and society.

Influencing Factors of Kinesiophobia in Early Postoperative Patients with HNC

The results of this study suggest that tracheotomy is a contributing factor to the severity of kinesiophobia in patients early after HNC, and patients who underwent tracheotomy exhibit higher levels of kinesiophobia. Multiple studies have confirmed that the presence of a tracheal tube causes patients to worry about moving their heads and feel uneasy.[28,29] Tracheotomy is an invasive procedure involving percutaneous incision of the cervical trachea and insertion of a tracheal cannula to establish an artificial airway. Its primary purposes include maintaining airway patency, facilitating mechanical ventilation, and enabling intra-airway interventions. Tracheotomy disrupts the integrity of neck tissues, leading to a loss of airway heating and humidifying functions, excessive airway secretions, impaired swallowing and speech abilities, and respiratory muscle weakness. The presence of the tracheal cannula introduces a foreign body sensation, which increases coughing and sputum production, resulting in chest and abdominal muscle tension and incision-related pain.[30] Altered breathing patterns may contribute to the development of kinesiophobia in patients.[31] It is recommended that healthcare professionals prioritize comprehensive assessment and care for patients undergoing tracheotomy, closely monitor for associated complications, and select appropriately sized cannulas to minimize neck discomfort. Preoperative education should include explanations of expected postoperative breathing changes, while postoperative care should be reinforced through interventions such as heated humidification and increased frequency of airway moisturizing to effectively alleviate kinesiophobia caused by altered respiratory patterns.

This study identified that skin flap transplantation and immobilization are factors influencing the severity of postoperative kinesiophobia in early-stage head and neck cancer patients. Due to the complex anatomical structure of the head and neck region, tissue reconstruction via skin flap transplantation is required for certain procedures. Flaps are typically harvested from donor sites such as the forearm, quadriceps femoris, pectoralis major, or latissimus dorsi muscles, before being transplanted to corresponding recipient areas. This procedure often necessitates two to three incisions, resulting in postoperative pain at multiple sites. This multifocal pain may further induce kinesiophobia, with patients frequently worrying that limb movement could compromise flap survival or impede wound healing.[32] Flap survival depends on microvascular anastomoses. Patients fear that neck movements may traction or damage fragile vessels, causing arterial ischemia or venous stasis in the flap, leading to partial or complete necrosis. Flap necrosis not only signifies surgical failure but may necessitate complex secondary reconstruction and result in severe tissue defects.[33] As a core region defining personal image and identity, head and neck flap failure may cause facial asymmetry, depressions, hypertrophic scarring, or abnormal skin texture and coloration, resulting in disfiguring appearance.[34] Some head and neck cancer patients typically require 48–72 hours of immobilization postoperatively, maintained in a neutral head position or specific tilted posture. During this period, patients frequently experience immobilization syndrome symptoms such as shoulder and neck stiffness and pain. Upon transitioning from immobilization to rehabilitation, the long-held cognitive belief that "rest equals safety" clashes sharply with new activity requirements. This cognitive dissonance triggers significant anxiety regarding functional exercises, compounded by fears that movement may cause wound dehiscence or graft necrosis, perpetuating heightened anxiety.[35] Particularly noteworthy is that conventional medical guidance typically specifies immobilization duration without providing explicit, progressive activity protocols.[36] This lack of specific guidance further exacerbates patient confusion and unease. During immobilization, the absence of successful experiences with safe movement diminishes self-efficacy and erodes confidence in rehabilitation exercises. It is therefore recommended that healthcare professionals enhance health education for flap transplant patients using tools such as video animations. These should detail surgical procedures and postoperative care protocols, instructing patients to monitor changes in flap skin texture, temperature, and color. In clinical practice, establishing a systematic immobilization management protocol is essential. This should include defining the precise timing and duration for initiating immobilization, formulating a progressive activity plan, and ensuring the first functional activity post-immobilization is conducted under medical supervision. By ensuring a safe and effective initial experience, it effectively alleviates kinesiophobia.

The results of this study suggest that lymph node dissection significantly influences the severity of kinesiophobia in patients during the early postoperative period following HNC surgery. Cervical lymph node dissection is a common surgical procedure for head and neck malignancies, including thyroid cancer, oral cavity cancer, laryngeal cancer, and hypopharyngeal cancer. This procedure enables the complete removal of metastatic lymph nodes; however, it may lead to complications such as shoulder and neck dysfunction, chyle leakage, hemorrhage, and infection. The extent of resection

is determined by the location and spread of lymph node metastasis.[36,37] Cervical lymph node dissection is classified into seven anatomical zones (I–VII). A more extensive resection typically involves a larger incision and greater tissue trauma, which can damage surrounding nerves, blood vessels, and muscles. This damage may impair the patient's ability to support their head and reduce stability during movement, potentially contributing to the development of kinesiophobia.[38] Additionally, a large wound following cervical lymph node dissection may affect physical appearance and result in scar contracture. It is recommended that healthcare providers enhance perioperative care and postoperative guidance for patients undergoing neck lymph node dissection. For patients experiencing reduced neck muscle strength and stability, the early use of cervical braces can help alleviate neck strain and emphasize the importance of early mobilization and rehabilitation. Additionally, comprehensive management strategies, including neck and shoulder functional exercises and the application of scar-reducing creams, can be implemented for patients with scar contracture to relieve wound tightness and alleviate kinesiophobiat.[39]

The findings of this study indicate that self-efficacy is a significant contributing factor to the level of kinesiophobia in patients with HNC during the early postoperative period. Specifically, lower levels of self-efficacy are associated with higher levels of kinesiophobia. Self-efficacy refers to an individual's belief in their ability to successfully perform a specific task or behavior. In the field of rehabilitation, self-efficacy can motivate patients to persist with exercise, manage pain, and adapt to functional impairments. When facing radical surgery for head and neck tumors, individuals with high self-efficacy are generally better equipped to handle movement-related fears and anxieties. They adhere closely to healthcare recommendations for rehabilitation exercises and maintain confidence in their ability to recover. In contrast, individuals with low self-efficacy are more vulnerable to developing kinesiophobia and may reduce physical activity as a result.[40] Studies have shown that self-efficacy can not only directly influence an individual's level of kinesiophobia, but also indirectly affect it by shaping their cognitive and attitudinal responses toward physical activity.[41] It is recommended that healthcare professionals develop multi-dimensional intervention programmes to enhance patients' sense of self-efficacy. This may be achieved by carefully structuring graded rehabilitation tasks to cultivate a sense of mastery, ensuring patients experience a continuous sequence of successes. Arranging peer demonstrations by rehabilitants with similar surgical backgrounds can bolster confidence in recovery. Providing objective, specific feedback reinforces patients' recognition of their capabilities, while teaching relaxation techniques helps alleviate kinesiophobia.[42]

This study indicates that fatigue is a significant factor influencing the severity of kinesiophobia in the early postoperative period among head and neck cancer patients. Research confirms a positive correlation between fatigue levels and kinesiophobia severity. Cancer-related fatigue, a multidimensional subjective exhaustion stemming from the disease itself and its comprehensive treatments (including surgery, radiotherapy, and chemotherapy), is particularly pronounced among head and neck cancer patients—with a prevalence ranging from 14% to 100%.[43] It exhibits distinct clinical characteristics compared to ordinary fatigue: It is more severe, accompanied by marked physical discomfort, and cannot be fully alleviated by rest. Its negative impact on patients' quality of life may even exceed that of common symptoms such as nausea and vomiting.[44] Pathologically, treatment regimens such as preoperative induction chemotherapy and postoperative adjuvant radiotherapy/chemotherapy significantly exacerbate iatrogenic fatigue through multiple pathways including inflammatory responses, bone marrow suppression-induced anemia, and neurotoxicity.[43,44] This treatment-related fatigue compounds with fatigue stemming from surgical trauma, creating a synergistic effect that collectively depletes patients' physiological reserves and psychological resilience. This state reinforces patients' cognitive misperception that activity may worsen their condition, perpetuating a vicious cycle of fatigue-fear-reduced activity-functional decline-exacerbated fatigue. This mechanism continuously elevates exercise avoidance, ultimately leading to diminished self-care capacity, impaired social functioning, and reduced rehabilitation adherence. Therefore, clinicians should establish evidence-based, comprehensive management strategies: initiating fatigue screening and anticipatory guidance early in treatment; developing individualized, graded exercise programmes tailored to fatigue characteristics at different treatment stages; and integrating energy conservation techniques and activity pacing training into daily rehabilitation plans. Through multidimensional interventions, this vicious cycle can be broken, ultimately improving patients' rehabilitation outcomes and quality of life.

Limitations

This study has the following limitations. As a single-center cross-sectional investigation, the convenience sampling method may introduce selection bias. Although our hospital is a national cancer center admitting patients from across the country, referral patterns and geographical factors may have resulted in a sample that is not fully representative of remote regions or economically disadvantaged populations. Restricting the age range to 18–80 years has prevented us from fully exploring the manifestations and influencing factors of kinesiophobia within special age groups such as the elderly or the very young. Furthermore, the study excluded key clinical variables such as the interval between surgery and assessment, and history of preoperative adjuvant therapy, which may influence patients' fatigue levels and kinesiophobia. Cross-sectional designs preclude causal inference, we can only measure associations between variables at a single point in time and cannot determine the causal relationship between factors such as fatigue and self-efficacy and kinesiophobia. Confounding factors including variations in surgical procedures and rehabilitation protocols across different medical centers require consideration. Future multicenter prospective studies controlling for these confounding variables are required to further validate the findings of this research and explore causal relationships between variables.

Conclusion

The prevalence of kinesiophobia among early postoperative patients with HNC was found to be elevated, with tracheotomy, skin flap transplantation, immobilization, lymph node dissection, self-efficacy, and fatigue identified as key contributing factors. Therefore, healthcare professionals routinely employ the TSK-11 scale for screening in the early postoperative period, combined with GSES and BFI-C assessments, to achieve early identification of high-risk patients with a total score ≥17 points. Implement personalized interventions according to surgical type, including providing visual guidance materials with restricted activity ranges for flap transplant patients, developing phased shoulder joint training programmes for lymph node dissection patients, and designing progressive respiratory and neck muscle training plans for tracheotomy patients. Concurrently, establish a team of trained rehabilitation patient volunteers to conduct bedside demonstrations and compile home rehabilitation guidance manuals to train caregivers. It is recommended that multidisciplinary teams conduct systematic assessments in the early postoperative period and prior to discharge, dynamically adjusting exercise prescriptions. This structured intervention system ensures patients progressively regain function under safe conditions, ultimately effectively reducing kinesiophobia and improving outcomes.

Clinical Trial Registration

https://www.chictr.org.cn/index.html, 2024-08-21, ChiCTR2400088579.

Abbreviations

HNC, Head and neck cancer; CRF, Cancer-related fatigue; BMI, body mass index: TSK-11: Tampa kinesiophobia-11 scale; BFI-C: The Chinese Version of the Brief Fatigue Inventory; GESE: General Self-Efficacy Scale.

Data Sharing Statement

The data used to support the findings of this study are available from the corresponding author upon request.

Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki (as was revised in 2013). The study was approved by Ethics Committee of the Zhejiang Cancer Hospital (Approval no. 2024-42). Written informed consent was obtained from all participants.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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