

# Analysis of Factors Correlated with Postoperative Kinesiophobia in Patients with Cervical Spondylotic Myelopathy: A Cross-Sectional Survey

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**Objective:** To investigate the prevalence of postoperative kinesiophobia in patients with cervical spondylotic myelopathy (CSM) and factors influencing the occurrence of kinesiophobia, to provide relevant basis for making clinical decisions for targeted interventions.

**Methods:** We enrolled a total of 85 patients who underwent CSM surgery at two grade-A general public hospitals in Fujian Province between September 2021 and May 2022. We conducted a questionnaire survey using the Tampa Scale for Kinesiophobia (TSK) and the Zung Self-Rating Anxiety Scale (SAS). Patients evaluated pain using a visual analogue scale. We used one-way ANOVA and logistic multiple regression analysis to identify the relevant influencing factors.

**Results:** The TSK score was  $(41.88 \pm 4.46)$  in 85 postoperative CSM patients, 65 males and 20 females, and there were 31 patients under 40 years old, 54 patients over 40 years old, 58 patients below high school education and 27 patients above high school education, and among them, 81.17% were diagnosed with kinesiophobia. Age was positively correlated with TSK score ( $r = 0.379$ ,  $P < 0.05$ ) and therefore a risk factor for kinesiophobia (OR = 1.941, 95% CI = 1.021–3.690). Additionally, the duration of the disease was a protective factor for kinesiophobia (OR = 0.179, 95% CI = 0.053–0.605).

**Conclusion:** Patients with CSM were at high risk of developing kinesiophobia postoperatively. Age and duration of the disease were factors influencing the occurrence of kinesiophobia in this group.

**Keywords:** cervical spondylotic myelopathy, influencing factors, kinesiophobia, postoperative

## Introduction

As the most severe type, cervical spondylotic myelopathy (CSM) accounts for approximately 10–15% of all cases of cervical spondylopathy.<sup>1</sup> CSM refers to secondary, chronic, and progressive damage of spinal cord functions resulting from chronic spinal cord compression due to degeneration of the cervical intervertebral junctions.<sup>2,3</sup> Clinical manifestations include cervical pain, limb numbness, motor, and sensory disorders, with a relative high disability rate. As per statistical estimates, roughly two-thirds of the population in developed countries have experienced cervical pain.<sup>4</sup> The loss of life loss due to cervical pain ranks first among non-fatal diseases.<sup>5</sup> Surgery can quickly relieve the compression and terminate the irreversible damage to the spinal nerve, and hence is very important for the recovery of nerve function, making it the first choice of treatment in CSM at present. However, it is not an infallible strategy.<sup>6</sup> Studies have shown that reasonable functional exercise after surgery can effectively improve the prognosis of patients with cervical spondylosis and promote postoperative rehabilitation.<sup>7,8</sup> Kinesiophobia is defined as the fear and avoidance of pain, and specifically, avoidance of physical movement, and this fear-avoidance model was first described by Lethem et al.<sup>9</sup> In

recent years, it has been used clinically.<sup>10,11</sup> Kinesiophobia impacts postoperative recovery in patients with CSM. It is a specific psychological phenomenon referring to the excessive and irrational fear of physical movement due to the dread that daily activities or physical exercise may cause further damage or repeated injury to the body.<sup>12–14</sup> Studies on kinesiophobia have been reported in patients with lumbar degenerative pain<sup>15</sup> and postoperative lung cancer.<sup>16</sup> However, there are few studies and analysis of postoperative kinesiophobia in patients with CSM. In this study, we aim to provide a basis for further research on rehabilitation strategies for postoperative kinesiophobia in patients with CSM patients by exploring its prevalence and related factors.

## Materials and Methods

### Study Participants

We selected a total of 85 CSM patients who underwent Anterior/Posterior Cervical Discectomy Fusion surgery in two grade-A general public hospitals in Fujian Province between September 2021 and May 2022. The number of study participants is determined based on the number of entries in TSK. Due to the number of items in the questionnaire is 17, the number of study participants is at least 5 times that of TSK.<sup>17</sup> Therefore, we selected a total of 85 patients. The sample was selected using random sampling method. Inclusion criteria were as follows: (1) Age  $\geq 18$  years; (2) Confirmed cervical disc herniation and compression in preoperative MRI and CT, accompanied by typical spinal signs of cervical spondylosis, and the diagnosis of CSM; (3) This was the first surgical treatment, and there were no contraindications for surgery; (4) Informed and voluntary participation in this study; (5) Capable of communicating normally with the researchers. Exclusion criteria<sup>18,19</sup> were as follows: (1) Pre-existing pain-causing diseases other than postoperative pain resulting from CSM; (2) Pre-existing medical history of cervical spine surgery; (3) Pre-existing medical history of psychiatric illness; (4) Bedridden for a long time before surgery, unable to walk, or completely dependent on others for self-care; (5) Restricted postoperative activities resulting from complications or adverse reactions; (6) Postoperative neurological dysfunction. This study was approved by the Ethics Committee of Union Hospital of Fujian Medical University (Ethics No. 2023KY106).

### Research Tools

#### General Information Questionnaire

We finalized a questionnaire pertaining to the patients' sociodemographic data and general condition, consisting of the following 10 items: gender, age, educational background, occupation, marital status, lifestyle, duration of the disease, site of pain, type of surgery, and presence of indwelling catheter.

#### Tampa Scale of Kinesiophobia (TSK)

The Tampa scale of kinesiophobia (TSK) was developed by Miller et al.<sup>20</sup> This is a self-rated questionnaire containing 17 items designed to assess subjective ratings of kinesiophobia. Cronbach's  $\alpha$  value was 0.778, with a test-retest reliability of 0.860, indicating good reliability and validity. The response for each item is on a four-point Likert scale, and the final score ranges from 17 to 68. The higher the score, the higher the degree of kinesiophobia.<sup>21</sup> Patients with scores over 37 are diagnosed as having kinesiophobia. TSK was first used abroad extensively for self-assessment in the intensity of fear in patients with chronic low back pain.<sup>22</sup>

#### Visual Analogue Scale (VAS)

This scoring method mainly assesses the pain level by patients themselves marking the degree of pain on an evaluation form, with scores from 0–10 points.<sup>23,24</sup> A score of 0–3 points indicates mild pain, a score of 4–6 indicates moderate pain, and a score of 7–10 points indicates severe pain.

#### Self-Rating Anxiety Scale (SAS)

The scale was devised by William Zung<sup>25</sup> and contains 20 items, all of which are graded from 1 to 4. The final score is the sum of all items multiplied by 1.25 and the integer part of the product is considered. A final score of 20–49 indicates no anxiety, a score of 50–59 indicates mild anxiety, a score of 60–69 indicates moderate anxiety, and a score of  $> 69$  indicates severe anxiety.

## Study Methods

Firstly, researchers explained the study to patients in the ward and distributed questionnaires to them with the help of the head nurses. Then, they explained the purpose of the study, guided them on how to fill up the questionnaire, and distributed the questionnaires. This study strictly followed the principles of informed consent, confidentiality, and voluntary participation. A total of 85 questionnaires were given out, and 85 were collected back with a return rate of 100%. There were 0 invalid questionnaires with an effective rate of 100%.

## Statistical Analysis

We used SPSS 21.0 software for data analysis. One-way ANOVA was used for each factor, while logistic multiple regression analysis was used for multivariate analysis.  $P < 0.05$  was considered statistically significant.

## Results

### TSK, VAS, and SAS Scores of Postoperative Kinesiophobia in Patients with CSM

The average postoperative TSK score of patients with CSM was  $(41.88 \pm 4.46)$ , and 69 patients (81.17%) were diagnosed with kinesiophobia. The median VAS score of patients was 3 points and all patients scored  $\leq 3$  points. The average SAS score was  $(44.90 \pm 3.43)$ , while the SAS scores of all patients was  $< 50$  points.

### One-Way ANOVA Analysis of Postoperative TSK Scores in Patients with CSM

Univariate analysis was performed on the gender, age, educational background, marital status, duration of the disease, site of pain, site of surgery, presence of indwelling catheter, and TSK scores in postoperative CSM patients;  $P < 0.05$  was considered statistically significant. Among these, gender, age, educational background, and duration of the disease were statistically significant (Table 1).

**Table 1** Univariate Analysis of Postoperative Kinesiophobia in Patients with CSM Patients (n=85)

Items	Number of Cases	Score ( $\bar{x} \pm s$ )	t/F value	P value
Gender			-2.066	0.042
Male (1)	65	$41.34 \pm 4.47$		
Female (2)	20	$43.65 \pm 4.06$		
Age (years)			2.320	0.046
20~29	11	$40.73 \pm 7.44$		
30~39	20	$39.70 \pm 3.72$		
40~49	21	$42.81 \pm 2.52$		
50~59	14	$42.57 \pm 5.11$		
60~69	19	$43.32 \pm 3.44$		
Educational background			3.622	0.009
Primary school	22	$44.45 \pm 2.55$		
Junior high school	36	$41.19 \pm 3.91$		
High school	13	$40.54 \pm 4.29$		
Specialized subject	11	$39.82 \pm 5.38$		
Bachelor's degree or above	3	$44.67 \pm 10.79$		
Marital status			0.847	0.458
Unmarried	4	$45.75 \pm 9.54$		
Married	81	$41.69 \pm 4.09$		
Duration of the disease			4.482	0.006
<3 months	11	$44.09 \pm 4.72$		
3~6 months	17	$44.06 \pm 3.03$		

(Continued)

**Table 1** (Continued).

Items	Number of Cases	Score ( $\bar{x}\pm s$ )	t/F value	P value
6–12 months	37	41.41 $\pm$ 4.54	1.520	0.216
>12 months	20	39.70 $\pm$ 4.11		
Site of pain				
Neck	45	41.20 $\pm$ 5.41		
Lower back	9	41.00 $\pm$ 3.04	2.099	0.054
Surgical incision	26	42.85 $\pm$ 2.46		
Abdomen	0	0		
Others	5	44.60 $\pm$ 4.22		
Site of surgery			0.629	0.598
Anterior approach	64	42.50 $\pm$ 4.16		
Posterior approach	21	40.00 $\pm$ 4.91		
Indwelling tubes				
Ureter catheter	40	41.48 $\pm$ 3.88	0.629	0.598
Gastric tube	2	40.50 $\pm$ 2.12		
Indwelling needle	29	41.86 $\pm$ 4.315		
Instrument tubing	0	0		
Drainage tube	14	43.29 $\pm$ 6.32	0.629	0.598
Others	0	0		

## Logistic Regression Analysis of Factors Influencing Postoperative Kinesiophobia in Patients with CSM

The current kinesiophobia symptom score was taken as the dependent variable (no Kinesiophobia = 1, Kinesiophobia = 2), and the variables with statistical significance in the sociodemographic data were taken as the independent variables, namely, gender (male = 1, female = 2), age (20–29 years old = 1, 30–39 years old = 2, 40–49 years old = 3, 50–59 years old = 4, 60–69 years old = 5), educational background (primary school = 1, middle school = 2, high school = 3, junior college = 4, bachelor's degree or above = 5), duration of the disease (< 3 months = 1, 3–6 months = 2, 6–12 months = 3, > 12 months = 4), and then logistic regression analysis was performed. Results showed that age was a risk factor for kinesiophobia (OR = 1.941, 95% CI = 1.021–3.690). The duration of the disease was a protective factor for kinesiophobia (OR = 0.179, 95% CI = 0.053–0.605) (Table 2).

## Discussion

This study focused on investigating the current situation and related influencing factors of kinesiophobia after CSM surgery, aiming to clarify the incidence of kinesiophobia after CSM surgery, and explore the influence of related factors on kinesiophobia, so as to provide relevant theoretical basis for guiding clinical practice and promoting the rehabilitation of patients.

## Prevalence of Postoperative Kinesiophobia in Patients with CSM

We found that the average postoperative TSK score of patients with CSM was (41.88 $\pm$ 4.46), and among them, 81.17% were diagnosed as having postoperative kinesiophobia. This prevalence rate of postoperative

**Table 2** Logistic Regression Analysis of Factors Influencing Postoperative Kinesiophobia in Patients with CSM

Independent Variable	B	SE	Wald $\chi^2$	OR	95% CI	P value
Term of constant						
Age	0.663	0.328	4.093	1.941	1.021–3.690	0.043
Duration of the disease	−1.172	0.622	7.656	0.179	0.053–0.605	0.006

kinesiophobia was higher than the 67.13% found by Song et al<sup>26,27</sup> in lumbar disc herniation (LDH), and slightly lower than the 81.5% in the research on cervical disc surgery patients,<sup>28</sup> indicating a higher risk of postoperative kinesiophobia in patients with CSM. Due to the possible adverse impact of kinesiophobia on postoperative rehabilitation, medical professionals should conduct preoperative evaluation of kinesiophobia to improve the quality of postoperative rehabilitation. Secondly, medical professionals should strengthen the health education inputs to patients during rehabilitation to relieve their anxiety, and encourage them to cooperate and actively participate in rehabilitation exercises.

## Influencing Factors in Postoperative Kinesiophobia in Patients with CSM

### Age Was a Risk Factor for Kinesiophobia

Our results showed that age was a risk factor for kinesiophobia (OR = 1.941, 95% CI = 1.021–3.690), indicating that the older the patients were after CSM surgery, the higher the incidence of kinesiophobia. Studies have shown that people's cognitive ability gradually decreases with aging after the age of 30 years.<sup>29</sup> However, kinesiophobia is a psychological cognitive disorder. Failure to correctly understand kinesiophobia can affect postoperative rehabilitation. Previous studies have shown that the elderly are generally lower than the young and middle-aged in terms of receptivity and physical fitness. In terms of exercise fear, the elderly patients were generally higher than the young and middle-aged patients.<sup>30</sup> This finding suggests that medical professionals need to conduct timely health education for older patients to get a correct understanding of kinesiophobia, so as to encourage rehabilitation and improve the quality of postoperative rehabilitation.

### Duration of the Disease Was a Protective Factor for Kinesiophobia

Our results showed that the duration of the disease was a protective factor for kinesiophobia (OR = 0.179, 95% CI = 0.053–0.605), indicating that the longer the duration of the disease, the lower the risk of postoperative kinesiophobia. In this study, the duration of the disease in all patients who did not have kinesiophobia was more than 6 months. This may be because patients with a longer duration of the disease were burdened by the disease, mainly manifesting as limb numbness, for a long time, which affected them in the long-term and resulted in poor quality of life. Therefore, these patients acquired more knowledge about the disease. In a conversation with the researchers, a patient mentioned that he had become more tolerant of the pain and numbness caused by the disease, and the postoperative symptoms were much less than before. Therefore, the patient had a lower level of kinesiophobia and was more cooperative with the medical staff during treatment. In order to reduce the level of postoperative kinesiophobia in patients with a shorter duration of the disease, it is necessary to assess the TSK score preoperatively, and educate patients about postoperative complications and rehabilitation methods in the process of treatment and nursing.

Our results showed that the postoperative SAS score of all patients with CSM was lower than 60 points, indicating no anxiety. One reason may be that all the patients were treated in grade-A hospitals, and had a high degree of trust in doctors and nurses. Secondly, their symptoms significantly improved after the surgery, and they were feeling better postoperatively than prior to the surgery, thus lessening their anxiety. However, in contrast to our findings, Song et al found that the severity of postoperative kinesiophobia in LDH patients was positively correlated with anxiety and depression symptoms.<sup>25</sup> In addition, in this study, the VAS score of all patients was  $\leq 3$  at the time of the research, so the relationship between pain and postoperative kinesiophobia in CSM patients remained undetermined. During data collection, most patients were in a calm state with a positive mental outlook; while only a few patients complained of lower back discomfort caused by prolonged lying; the remaining patients had no obvious pain and discomfort. However, Song et al<sup>27</sup> found that the higher the VAS score, the higher the severity of postoperative kinesiophobia in patients with LDH. In this respect, we recommend that further research studies be taken up with a larger sample size to explore the effect of short-term and long-term postoperative pain on kinesiophobia. Additionally, we found that all the female patients in our study were diagnosed with kinesiophobia. This may be due to the small number of cases in the current study (only 20), thus more studies are needed to explore the relationship between gender and the occurrence of kinesiophobia.

Limitations of this study were that we enrolled patients from only two grade-A general public hospitals in Fujian Province, with a small sample size and lacking representativeness. Additional studies with a larger sample size and further analysis on factors influencing postoperative kinesiophobia in patients with CSM are needed in the future.

## Conclusion

In this study, the main factors influencing postoperative kinesiophobia in patients with CSM were age and duration of the disease. Medical personnel should evaluate the postoperative TSK score of patients with CSM at the earliest, provide relevant and timely education to patients about the disease, inform patients of perioperative precautions, complications and related factors affecting the prognosis, and guide patients to perform early postoperative rehabilitation exercises correctly.

## Abbreviations

CSM, Cervical spondylotic myelopathy; TSK, Tampa scale of kinesiophobia; VAS, Visual Analogue Scale; SAS, Self-rating Anxiety Scale; LDH, lumbar disc herniation.

## Ethics Approval Statement

This study was conducted with approval from the Ethics Committee of Fujian Medical University Union Hospital (No.2023KY106). This study was conducted in accordance with the declaration of Helsinki. Written informed consent was obtained from all participants.

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## Disclosure

Gui-Qin Zhong and Bi-Hua Lin contributed equally to this paper and are co-first authors. The authors report no conflicts of interest in this work.

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