Factors Predicting Health-Related Quality of Life among People with Cervical Spondylosis Undergoing Anterior Cervical Discectomy and Fusion: A Cross-Sectional Study

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Abstract: Cervical spondylosis affects many people worldwide and is a natural age-related disease associated with degenerative changes within the intervertebral disc. Despite the efficacy of anterior cervical discectomy and fusion, people who undergo this operation can experience various symptoms that impact their health-related quality of life. Developing effective programs to improve health-related quality of life requires understanding the factors that predict it in this population. This cross-sectional study aimed to determine the health-related quality of life in people with anterior cervical discectomy and fusion and identify factors predicting the physical and mental components of health-related quality of life.

This study had a convenience sample of 308 adults and older adults post-anterior cervical discectomy and fusion in Shanghai City, China. The data were collected through an online survey platform when participants were discharged. The research instruments included the Eating Assessment Tool-10, the Neck Disability Index, the Short Form Geriatric Depression Scale, the Multidimensional Scale of Perceived Social Support, and the Short Form Health Survey Version 1. Data analysis used descriptive statistics, Pearson's correlation, and hierarchical multiple regression.

The findings revealed a moderate level of health-related quality of life among people with anterior cervical discectomy and fusion. Remaining disability and depression could explain 46.50% of the variance in the physical component of the health-related quality of life. In contrast, smoking, gender, social support, depression, and remaining disability could explain 48.40% of the variance in the mental health component. The findings are useful for health professionals, including nurses, in designing comprehensive programs based on these factors to help people with anterior cervical discectomy and fusion to improve both the physical and mental health components of their quality of life. However, it is recommended that this study be replicated with different samples in different locations.

Keywords: Anterior cervical discectomy and fusion, Cervical spondylosis, Health-related quality of life, Hierarchical multiple regression, Nursing care, Predicting factors

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Introduction

Cervical spondylosis (CS) represents a significant global health concern and is a natural age-related disease associated with degenerative changes within the intervertebral disc. While China's CS prevalence was 13.76%, with Beijing's burgeoning population, approximately 2.75 million individuals are estimated to be affected by CS.[1] Anterior cervical discectomy and fusion (ACDF) is considered a benchmark approach regarding the treatment of cervical myelopathy and radiculopathy due to its favorable postoperative outcomes.[2,3]

Patient outcomes in the literature exhibit considerable variability. Persistent signs, symptoms, and postoperative ACDF complications at discharge have negatively impacted people's HRQoL.[4] According to Stull et al.,[5] significant reductions in neck pain, physical function, and disability were demonstrated in people after ACDF surgery. Consequently, these complications may adversely affect the HRQoL of people with ACDF (PW-ACDF).

The one-month post-discharge period is critical for PW-ACDF because it is required for crucial rehabilitation. One study has highlighted the early protective phase of four to eight weeks, during which people are advised to revisit their physical rehabilitation department each week to evaluate their pain and adherence to their exercise program under their physical therapist's supervision. This may impact people's HRQoL, especially in the physical component. PW-ACDF who still have persistent signs and symptoms and physical symptoms may also cause mental problems. Therefore, rehabilitation is necessary during this time frame to ensure people can resume their social life activities.[6]

Previous studies on ACDF surgery have focused on people's satisfaction, complications, outcomes, and the impact on HRQoL.[5] However, the investigation of predicting factors has not been addressed.[6] Previous studies aiming to evaluate HRQoL have focused on single-level ACDF surgery that removed only one degenerative disc. No study has tested the factors predicting HRQoL in PW-ACDF one month after discharge in China. Therefore, investigating this gap will enhance our understanding of multi-level ACDF surgery, which removes two or more degenerative discs. These results can aid the improved knowledge of HRQoL among PW-ACDF, informing nursing strategies for improved discharge preparation and intervention planning, ultimately leading to enhanced HRQoL.

Review of Literature and Conceptual Framework

Regarding this study's conceptual framework, we were guided by Ferrans's revised version of Wilson and Cleary's original model and a literature review.[7] Ferrans's revised model explains factors that predict HRQoL. These factors include environmental and individual characteristics, biological function, general health perception, functional status, and symptoms. Firstly, biological function (originally biological and physiological variables) focuses on cells, organs, and organ system function and is evaluated via indicators, for example, laboratory tests, physical assessments, and medical diagnosis. The next component, symptoms (originally symptom status), refers to those of a physical, emotional, or cognitive nature based on an individual's perception. In an extensive literature review, we found the most common and significant symptoms of PW-ACDF include persistent neck/arm pain, dysphagia, and depression, all of which were evaluated in this study. The third component, functional status, comprises physical, psychological, social, and role functions. For PW-ACDF, the remaining disability is the functional status related to problems with limited activities and neck disability, affecting bodily functions and limiting individuals' participation in different activities.[8] The fourth aspect is related to perceptions of general health, which refer to a subjective ranking that involves all of

the preceding health concepts. Fifth, overall quality of life means subjective well-being, which refers to happiness or satisfaction with one's life. Demographic factors are considered individual characteristics, while social support is considered an environmental characteristic. Primary providers of social support, such as family, friends, and other significant factors, can help PW-ACDF cope with their challenges.

HRQoL is defined as how health affects PW-ACDF function ability and how these people perceive their life regarding physical, mental, and social well-being.[9] The SF-36 Version 1.0 is a profile assessment that produces eight scale scores and is grouped into two summary or global dimensions: the physical component summary (PCS) and the mental component summary (MCS).[10] The physical component consists of the following sub-scales: physical function, function role, bodily pain, and general health, whereas the mental component comprises mental health, emotional role, social function, and vitality. The literature review identified demographics, neck/arm pain, dysphagia, depression, remaining disability, and social support as factors related to HRQoL for PW-ACDF.[5-6]

Demographics include the characteristics of PW-ACDF associated with smoking status and advanced age. Age is considered a significant aspect of PW-ACDF, as increased age has been shown to constitute a substantial risk factor. Therefore, smoking status and advanced age were expected to be associated with HRQoL among PW-ACDF positively. Neck and arm pain refers to distressing experiences for PW-ACDF related to actual or potential tissue damage, encompassing social, cognitive, emotional, or sensory aspects.[11] For PW-ACDF on multiple levels, continued experience of neck pain comprises the most frequent residual complaint after ACDF surgery, with upper extremity radicular pain following. Therefore, neck and arm pain was expected to be negatively associated with HRQoL among PW-ACDF surgery. Dysphagia refers to difficulty swallowing, which poses dangers due to the increased risk of choking and is among the most common and concerning aspects after ACDF surgery. Dysphagia is commonly observed after PW-ACDF discharge from the hospital, impacting their HRQoL. Therefore, dysphagia was expected to be negatively associated with HRQoL among PW-ACDF. Remaining disability refers to the limitations on PW-ACDF activities and neck disability, affected bodily functions, and restrictions on individual participation in different activities.[8] Some PW-ACDF experience disability resulting in a reduced range of motion due to physical deficits, including diminished arm and hand strength and an inability to perform daily routine activities. Therefore, remaining disability was expected to be negatively associated with HRQoL among PW-ACDF.

Depression refers to a psychological state affecting PW-ACDF, characterized by low mood, lack of pleasure or interest, reduced energy levels, guilt or feelings of worthlessness, changes in appetite or sleep patterns, and difficulty concentrating.[12] PW-ACDF experience negative emotions such as depression and negative thoughts regarding the causes of persistent symptoms, perceived weaknesses, limited mobility without pain, and concerns about their future. Therefore, depression was expected to be negatively associated with HRQoL among PW-ACDF.

Social support consists of networks, including family and friends, that provide physical, psychological, and financial assistance to PW-ACDF with their needs.[13] Social support offered by family and friends positively influences HRQoL for PW-ACDF. Raising awareness and providing education give PW-ACDF a deeper understanding of their conditions, and a supportive attitude toward PW-ACDF plays a positive role in rehabilitation. Thus, social support was expected to positively affect HRQoL among PW-ACDF.

Despite the emphasis on complications, patient satisfaction, and HRQoL outcomes, limited information exists regarding HRQoL among PW-ACDF and predictive factors at one month post-discharge. Based on Ferrans's Revised Wilson and Cleary Model,[7] we

hypothesized that demographics, neck and arm pain, dysphagia, depression, remaining disability, and social support predict the physical component summary and the mental component summary of the HRQoL in PW-ACDF. In this study, the HRQoL was grouped into two summaries, namely the PCS and the MCS, so that we can gain insights into the specific aspects of a people's HRQoL to help identify whether the issues are more related to physical health or mental health. Secondly, having two separate components allows us to develop more specific and targeted interventions as a health care provider. Further, understanding the physical and mental health aspects of a person's HRQoL supports a more holistic approach to care. It encourages comprehensive care plans that address both physical and mental health problems. The results will contribute to an improved overall understanding of HRQoL among this population, informing nursing strategies for improved discharge preparation and intervention planning in future studies to enhance HRQoL.

Study Aim

This study aimed to examine 1) HRQoL levels among PW-ACDF one month after being discharged from a tertiary hospital and 2) the predictability of demographic factors, neck and arm pain persistence, remaining disability, depression, and social support on the physical and mental components of HRQoL among people with cervical spondylosis who have undergone anterior cervical discectomy and fusion.

Methods

Design: This study employed a descriptive cross-sectional design, and reporting adhered to the STROBE Statement—a checklist of items required for reporting observational studies.

Sample and Setting: This study enrolled 336 PW-ACDF from a tertiary hospital in Shanghai City, China, by convenience sampling. The inclusion criteria consisted of being aged between 30 and 70 years, one-month post-discharge from the hospital after undergoing multi-level ACDF, and being able to attend the orthopedic department for their ACDF operation. The exclusion criteria were having experienced single-level ACDF surgery and having been diagnosed with cervical vertebra malformation or a tumor. PW-ACDF with cognitive deficits were excluded. The study sample size was calculated based on Polit and Beck's standards for regression analysis.[14] The final sample included 280 participants and a 20% buffer for potential sample attrition. Thus, the estimated sample size was 336 participants.

Ethical Considerations: This research was approved by Chiang Mai University Faculty of Nursing's Research Ethics Review Committee, with study code 2021-EXP069. Participants agreeing to join the study were requested to provide written consent via an online form before data was collected to ensure voluntary participation. Data were only used for this study and not for other purposes. There were no significant risks for PW-ACDF as this was not an intervention study. Confidentiality was assured regarding participants' identities, while each individual was provided with an informed consent form with written agreement being obtained before administration of the questionnaires.

Instruments: All instruments were in Chinese versions. The following seven instruments were utilized for this study:

The Demographic Questionnaire was developed to record background data, including age, gender, smoking status, marital status, occupation, educational level, personal income, living arrangement (urban/rural), and health-related information, including duration of diagnosis with cervical spondylosis, medication use, history of wound infection, and surgical level.

The Numerical Rating Scale (NRS), developed by Hawker,[15] measured neck and arm pain. The 1-item scale employs a score ranging from 0 to 10, with 0 representing 'no pain' and 10 representing 'worst

possible pain' by requesting the subject to identify the number. High test-retest reliability coefficients were observed in literate and illiterate people with rheumatoid arthritis (r = 0.96 and r = 0.95, respectively), preceding and following their medical consultations.[16]

The Eating Assessment Tool-10 (EAT-10) constitutes a dysphagia questionnaire that participants answer via self-reporting. Developed by Belafsky, it was utilized to evaluate dysphagia symptoms.[17] The EAT-10 includes ten items (e.g., My swallowing problem has caused me to lose weight) with a 5-point Likert scale response from 0, representing 'no problem,' while the highest, 4, stands for 'severe problem.' Possible scores are between 0 to 40, and a higher score means the patient has severe dysphagia. Regarding internal consistency reliability, analysis of this tool resulted in a Cronbach's alpha of 0.96 with test-retest intra-item correlation coefficients in the range of 0.72 to 0.91.[18] Cronbach's alpha was 0.91 for the pilot study and 0.94 for the actual study.

The Neck Disability Index (NDI) was developed by Howard Vernon in the 1980s.[19] The tool consisted of 10 items measuring the remaining disability (e.g., Pain Intensity: I have no pain at the moment). The item was rated using a scale of 6 points, where 0 represents 'no disability' and 5 stands for 'full disability.' A score of 0-20% represents mild functional impairment; 21-40% represents moderate dysfunction; 41-60% implies severe functional impairment; 61-80% stands for extremely severe functional impairment; and 81-100% represents complete functional impairment or detailed examination of an individual due to exaggerated symptoms. Cronbach's alpha was employed to measure internal consistency reliability, yielding a value of 0.80.[19] Cronbach's alpha was 0.75 for the pilot study and 0.82 for this actual study.

The Short-form Geriatric Depression Scale (GDS), created by Sheikh and Yesavage,[20] was used to determine the level of depression. This tool contains 15 items (e.g., Do you often get bored?) with a dichotomous response (yes = 1 and no = 0). The cutoff score is 5, with 0 to 5 indicating no depression, while scores over 5 suggest suffering from depression. GDS demonstrated strong internal consistency with a Cronbach's alpha value of 0.94.[21] Cronbach's alpha was 0.72 for the pilot study and 0.82 for the actual study.

The Multidimensional Scale of Perceived Social Support (MSPSS) assesses social support and was developed by Zimet.[22] It consists of 12 items (e.g., My family really tries to help me) that aim to determine how patients perceive the provision of support in three aspects: family, friends, and significant others.[22] Scale items are scored using a 7-point Likert scale: 1 equals 'don't agree' while 7 means 'agree' with greater scores showing higher social support levels. The score ranges from 12 to 84. The studies mentioned above have established acceptable internal consistency and test-retest reliability, with values of 0.92 and 0.87, respectively.[22] Cronbach's alpha was 0.96 for the pilot study and 0.96 for the actual study.

The Short Form Health Survey (SF-36) version 1 was used to determine HRQoL. The SF-36 Version 1.0 was chosen from a group of tools used in a study on medical outcomes, representing often-measured aspects of quality of life.[23] It was developed by the RAND Corporation[10] and contained 35 items (e.g., Compared to one year ago, how would you rate your health in general now?) divided into eight subscales or domains that form two higher-order domains: the physical component summary (PCS) and the mental health component summary (MCS).[8] The eight sub-scales contain various numbers of items (number of items in parentheses): physical function (10), function role (4), mental health (5), emotional role (3), social function (2), general health (5), vitality (4), and bodily pain (2). Based on the user manual for the instrument, scores across the eight domains have a total of 100. To calculate the average score for each dimension, item scores for each sub-scale were summed and then divided by the number of items. The levels were classified as follows: low = 0-50, moderate = 50-100. Higher scores indicate greater

quality of life.[23] Regarding internal reliability coefficients, the PCS and the MCS (0.85–0.87) demonstrated comparability with those obtained in the US and nine European nations for the MCS scale (0.85–0.90).[24] Cronbach's alpha was 0.88 for the pilot study and 0.92 for the actual study.

Data Collection: Data were collected from December 2021 to October 2022. Informed consent was acquired through a survey platform. Participants could complete the online questionnaires by scanning a QR code on a cellphone, iPad, or computer. The initial page showed the informed consent form, followed by the questionnaire items for participants. If they disagreed, a menu provided the option to exit from the platform without going through the questionnaires. The primary investigator managed data entry.

Data Analysis: We used descriptive statistics to describe the demographic data. The Kolmogorov–Smirnov test was utilized to assess continuous data variable normality, while the underlying assumption for Pearson's correlation and hierarchical multiple regression at a significant alpha level of .05 were tested. The results showed that the values of tolerance were higher than 0.5, and the VIF of all independent variables was lower than 5, which means that the multicollinearity assumption was not violated.

Based on the assumption tested, three sets of independent variables consisted of 1) the individual's characteristics and those of their environment, including age, smoking status, gender, and social support; 2) symptoms, including neck and arm pain, dysphagia, and depression; and 3) functional status, including remaining disability. These were consequently entered into the model in a series of steps.

Results

Demographic data

In this study, questionnaires were distributed to 350 participants, with 336 returned, yielding a response rate of 96%. Of these, 28 had missing data, leaving 308 (92%) for the final analysis. Most of the participants were in the middle-age group (51–60 years), and the majority were married (92.86%). Most participants (35.06%) had undergone four segments of ACDF, followed by three and two segments of ACDF, respectively. Regarding education, almost half (42.21%) had completed junior and senior school. Regarding smoking status, 44 (14.29%) participants were smoking when the study commenced. More than 50% of participants had monthly incomes below 5,000 RMB (Equivalent 687 USD). Hypertension was present in 146 (47.40%) participants, and 12 (3.90%) had a wound infection (see **Table 1**).

Table 1. Demographic characteristics of participants (N = 308)

Demographic characteristics	N	%
Gender		
Female	128	41.56
Male	180	58.44
Age (years) (Mean = 53.07, SD = 10.57, Range = 30–70)		
31–40	37	12.01
41–50	88	28.57
51–60	104	33.77
60–70	79	25.65
Marital status		
Married	286	92.86
Widowed	10	3.25
Single	7	2.27
Divorced	5	1.62

Table 1. Demographic characteristics of participants (N = 308) (Cont.)

Demographic characteristics	N	%
Educational level		
Below junior school	130	42.21
Senior school	86	27.92
Undergraduate	88	28.57
Graduate or above	4	1.30
Monthly income (RMB)		
≤ 5,000 (687 USD)	146	47.40
5,000-10,000 (687-1395 USD)	111	36.04
10,000-20,000 (1395-2791 USD)	31	10.06
> 20,000 (2791 USD)	20	6.49
Smoking		
Never	174	56.49
Used to smoke but quit smoking	90	29.22
Smoking	44	14.29
Hypertension		
Yes	89	28.90
No	219	71.11
Wound infection		
Yes	12	3.90
No	296	96.10
Surgery segments		
2	105	34.09
3	95	30.85
4	108	35.06

Each component of the SF-36 version 1 could be categorized as moderate or low based on the mean score interval.[25] **Table 2** reveals that the participants' average physical function was 61.27 (SD = 23.87), while their average physical role was 14.04 (SD = 29.58). The dimensions of General Health (GH), Physical Function (PF), Bodily Pain (BP), Vitality (VT), Mental Health (MH), and Social Function (SF) were self-rated by participants at a moderate level, while Role Physical (RP) and Role Emotional (RE) were at low levels.

Table 2. Possible and actual scores of range and levels of HRQoL (N = 308)

HRQoL Composites	Possible score	Actual score	Mean	SD	Level
General health	0-100	0-72	61.52	20.44	Moderate
Physical function	0-100	0-100	61.27	23.87	Moderate
Physical role	0-100	0-100	14.04	29.58	Low
Bodily pain	0-100	0-88	57.70	20.85	Moderate
Emotional role	0-100	0-100	36.04	43.26	Low
Vitality	0-100	0-66	60.89	16.11	Moderate
Mental Health	0-100	0-70	65.34	15.33	Moderate
Social Function	0-100	0-75	70.62	25.62	Moderate

The findings in **Table 3** demonstrate that being in the 41 to 50 age group and smoking had a positive relationship with HRQoL in the physical component ($p < 0.05$). Gender (being female), neck/arm pain, dysphagia, depression, and remaining disability had a negative relationship with HRQoL in the physical component ($p < 0.05$) (see **Table 3**). Being in the 41 to 50 age group and having social support had a positive relationship with HRQoL in the mental component ($p < 0.05$). In contrast, gender, dysphagia, depression, and remaining disability had a negative relationship with HQRoL in the mental component summary ($p < 0.05$) (see **Table 3**).

Table 3. Descriptive statistics and correlations for study variables (N = 308)

Variables	PCS		MCS	
	r	p-value	r	p-value
Age (41-50)	0.112	0.025	0.102	0.037
Gender	0.105	0.033	-0.125	0.014
Social support	-0.130	0.011	0.192	< 0.001
Neck and arm pain	-0.136	0.009		
Dysphagia	-0.255	< 0.001	-0.224	< 0.001
Depression	-0.501	< 0.001	-0.646	< 0.001
Remaining disability	-0.640	< 0.001	-0.475	< 0.001

Note. r value = correlation coefficients; PCS = physical function, role physical, bodily pain, and general health; MCS = mental health, role emotion, social function, and vitality

Predictors of HRQoL

Hierarchical multiple regression was utilized to analyze the physical and mental components of HRQoL predictors among PW-ACDF. The findings revealed that the characteristics relating to the individual and environment, the symptoms, and the functional status accounted for 46.5% of the total score variance in the PW-ACDF physical component. Remaining disability and depression were the significant predictors ($p < 0.01$) of the set of moderating resources and could predict PW-ACDF's physical component (see **Table 4**).

Table 4. Results of hierarchical regression analysis of factors predicting the physical component summary in HRQoL (N = 308)

Model predictors	b	SE (b)	Beta	t	p-value
1. (Constant)	52.068	6.960		7.481	< 0.001
Age (31-40)	-5.020	6.924	-0.091	0.725	0.469
Age (41-50)	-1.950	6.443	-0.054	-0.303	0.762
Age (51-60)	-7.092	6.384	-0.205	-1.111	0.268
Age (> 60)	-6.720	6.486	-0.179	-1.036	0.301
Smoking (used to smoke)	-2.594	2.791	-0.072	-0.929	0.353
Smoking (smoking)	1.536	3.406	0.033	0.451	0.652
Female	-5.377	2.677	-0.162	-2.009	0.045
MSPSS-12	0.071	0.047	0.087	1.500	0.135
R = 0.218, R2 = 0.048, R2 Adjusted = 0.022, R2 Change = 0.048					
Overall F(8,492.589) = 1.871, p = 0.064					

Table 4. Results of hierarchical regression analysis of factors predicting the physical component summary in HRQoL (N = 308) (Cont.)

Model predictors	b	SE (b)	Beta	t	p-value
2. (Constant)	69.109	6.318		10.938	< 0.001
Age (31-40)	-3.922	5.931	-0.071	-0.661	0.509
Age (41-50)	-2.234	5.500	-0.062	-0.406	0.685
Age (51-60)	-6.295	5.464	-0.182	-1.152	0.250
Age (> 60)	-5.671	5.552	-0.151	-1.021	0.308
Smoking(used to smoke)	-2.290	2.387	-0.064	-0.960	0.338
Smoking (smoking)	0.653	2.914	0.014	0.224	0.823
Female	-4.265	2.314	-0.128	-1.843	0.066
MSPSS-12	0.003	0.041	0.004	0.070	0.945
Pain	-2.085	1.062	-0.097	-1.962	0.051
EAT-10	-0.335	0.116	0.147	-2.896	0.004
GDS-15	-2.228	0.245	-0.459	-9.097	< 0.001
R = 0.560, R2 = 0.313, R2 Adjusted = 0.288, R2 Change = 0.266					
Overall F(11,2354.653) = 12.279, p < 0.001					
3. (Constant)	68.330	5.585		12.235	< 0.001
Age (31-40)	1.219	5.272	0.022	0.231	0.817
Age (41-50)	2.033	4.883	0.056	0.416	0.678
Age (51-60)	-0.725	4.867	-0.021	-0.149	0.882
Age (> 60)	-1.383	4.929	-0.037	-0.281	0.779
Smoking (used to smoke)	-2.398	2.110	-0.067	-1.137	0.256
Smoking	-1.142	2.583	-0.024	-0.442	0.659
Female	-2.068	2.059	-0.062	-1.004	0.316
MSPSS-12	0.000	0.036	0.001	0.012	0.990
Pain	-0.490	0.955	-0.023	-0.513	0.608
EAT-10	-0.098	0.105	-0.043	-0.925	0.356
GDS-15	-1.187	0.244	-0.244	-4.854	< 0.001
NDI	-0.987	0.108	-0.490	-9.161	< 0.001
R = 0.682, R2 = 0.465, R2 Adjusted = 0.444, R2 Change = 0.152					
Overall F(12,3206.132) = 21.404, p < 0.001					

The individual and environmental characteristics, symptoms, and functional status together represented 48.4% of the variance in the total score of the PW-ACDF mental component. Smoking, gender, social support, depression, and remaining disability were predictors of the mental component of the HRQoL of the PW-ACDF (see **Table 5**).

Table 5. Results of hierarchical regression analysis of factors predicting the mental component summary in HRQoL (N = 308) (Cont.)

Model predictors	b	SE (b)	Beta	t	p-value
1. (Constant)	49.290	8.165		6.036	< 0.001
Age (31-40)	1.188	8.123	0.018	0.146	0.884
Age (41-50)	-6.001	7.559	-0.139	0.794	0.428
Age (51-60)	-0.443	7.490	-0.011	-0.059	0.953
Age (> 60)	0.085	7.609	-0.002	-0.011	0.991
Smoking (used to smoke)	-4.702	3.274	-0.109	-1.436	0.152
Smoking (smoking)	-4.467	3.996	-0.083	-1.163	0.246
Female	-9.144	3.141	-0.230	-2.912	0.004
MSPSS-12	0.206	0.055	0.211	3.711	< 0.001
R =0.285, R2 = 0.081, R2 Adjusted = 0.056, R2 Change = 0.081					
Overall F(8,1193.196) = 3.292, p = 0.001					
2. (Constant)	70.127	6.677		10.518	< 0.001
Age (31-40)	1.223	6.258	0.019	0.195	0.845
Age (41-50)	5.123	5.804	0.118	0.883	0.378
Age (51-60)	-0.623	5.766	0.015	-0.108	0.014
Age (> 60)	0.187	5.858	0.004	0.032	0.975
Smoking (used to smoke)	-3.786	2.519	0.088	-1.503	0.134
Smoking (smoking)	-5.312	3.075	-0.095	-1.727	0.085
Female	-6.418	2.442	-0.163	-2.654	0.008
MSPSS-12	0.111	0.004	0.114	2.546	0.011
Pain	-0.110	1.121	-0.004	-0.098	0.922
EAT-10	-0.297	0.122	-0.109	-2.433	0.016
GDS-15	-3.472	0.258	-0.599	-13.433	< 0.001
R = 681, R2 = 464, R2 Adjusted = 0.444, R2 Change = 0.383					
Overall F(11,4972.365) = 23.285, p < 0.001					
3. (Constant)	69.786	6.550		10.654	< 0.001
Age (31-40)	3.478	6.183	0.053	0.562	0.574
Age (41-50)	6.994	5.728	0.161	1.221	0.223
Age (51-60)	1.819	5.709	0.044	0.319	0.750
Age (> 60)	2.067	5.781	0.046	0.358	0.721
Smoking (used to smoke)	-3.834	2.474	-0.089	-1.549	0.122
Smoking	-6.098	3.030	-0.109	-2.013	0.045
Female	-5.517	2.415	-0.139	-2.285	0.023
MSPSS-12	0.110	0.043	0.113	2.567	0.011
Pain	0.590	1.120	0.023	0.526	0.599
EAT-10	-0.193	0.124	-0.071	-1.559	0.120
GDS-15	-3.015	0.287	-0.520	-10.515	< 0.001
NDI	-0.433	0.126	-0.180	-3.425	0.001
R = 0.682, R2 = 0.465, R2 Adjusted = 0.444, R2 Change = 0.152					
Overall F(12,4759.432) = 23.096, p < 0.001					

Discussion

In the present study, the HRQoL of PW-ACDF after surgery was found to be at a moderate level, suggesting that ACDF surgery impacts multiple dimensions of the patient's HRQoL, such as general health and physical function. According to this study's results, surgery significantly improved HRQoL, as ACDF reduced neck pain, which positively affected psycho-social factors such as depression, which showed that all SF-36 domains showed a variable degree of improvement in the postoperative period. Subsequently, ACDF surgery is a suitable practice for cervical disc herniation treatment regarding HRQoL and alleviation of pain levels after operations.

The overall HRQoL after ACDF surgery indicated that PW-ACDF exhibited substantially reduced SF-36 measurements in role physical (RP) and role emotional (RE), with both dimensions at low levels.[26] In terms of mental status, the scores for the NDI demonstrated strong correlations to limited ability to perform daily life tasks or activities because of emotional distress. Low role physical scores can be explained possibly as work experiences or other daily activity problems because of physical health. Low scores of the RE can be explained as work or other daily activity problems, possibly due to emotional issues. Although PW-ACDF showed improvement following surgery, some symptoms remained, and there were limitations in their daily lives.[27] In Ko et al.'s study, remaining disability was moderately correlated with obstacles to social functioning because of PW-ACDF's emotional states or barriers in daily life resulting from patients' moods or energy levels.[28] As a result, PW-ACDF experience ongoing discomfort that impacts all facets of their work and daily life, causing negative emotions and psychological responses. This ultimately leads to a decline in their HRQoL in areas including RP and RE.

In this study, findings demonstrated that the individual and environmental characteristics, the symptoms, and the functional status altogether represented 46.5% of the variance of the total score of the PW-ACDF physical component. Remaining disability and depression were the strongest predictors of the set of moderating resources. It was also demonstrated that individual and environmental aspects, symptoms, and functional status together represented 48.4% of the variance in the total score of the PW-ACDF mental component. The predictors for these two components allow healthcare providers to develop specific interventions based on these significant factors of a people's HRQoL and support a holistic approach that addresses both physical and mental health problems.

The characteristics of an individual and the environment include age, smoking status, and social support. According to Lawless's study, age did not constitute an isolated risk factor regarding PW-ACDF complications.[29] Symptoms include dysphagia, neck/arm pain, and depression. Individuals grappling with neck/arm pain may also encounter additional issues, such as sleep disturbances and emotional stress, which can further diminish their overall HRQoL. Symptoms related to discomfort will impact PW-ACDF's HRQoL in addition to causing emotional problems, which need to be a focus of clinical nursing care. Functional status includes remaining disability. A significant number of individuals continued to experience limitations in neck-related physical function after surgery. Implementing nursing care, physical therapy, and an exercise program in the early stages of ACDF surgery improves pain management.

In this study, the researchers used age as a category instead of continuous data. The 41 to 50 age group showed a positive relationship with HRQoL in the physical and mental components. Prior studies have sought to explore the connection between HRQoL and age. Outcomes following ACDF surgery for people in the 55 and over age range do not present as substantially different to the outcomes in younger people.[30] This is consistent with our results because only the 41 to 50 age group showed a significant relationship with

HRQoL. Regarding the physical component, there was no difference between other age groups and HRQoL. Another study reported that significant improvements were observed in a group of 66 people under the age of 46 and a group of 72 people over the age of 46 at various postoperative time intervals. This result is also congruent with our findings.

Smoking had a positive relationship with HRQoL in the physical component, which means smoking had a positive influence. The reason is that in contrast to individuals who do not smoke, those who smoke exhibit a notably higher correlation with various postoperative complications, including overall complications, respiratory issues, the need for additional surgeries, extended hospital stays, dysphagia, infection of wounds, and neck pain following cervical spine surgery.[31] Peng also mentioned smoking to be an important risk factor regarding non-fusion following ACDF surgery. Furthermore, smoking can impact micro-vascular functioning and contribute to the deterioration of the fusion micro-environment.[32] Thus, smoking status could affect HRQoL in the physical component.

Gender, specifically female, had a negative relationship with HRQoL in the physical and mental components, consistent with Peolsson et al., who showed that male gender is one of the preoperative predictors of good ACDF outcomes.[33] Previous studies have reported possible risks related to gender.[34] It is recommended that nurses pay more attention to females' HRQoL regarding both the physical and mental components.

Neck and arm pain was negatively correlated with HRQoL in the physical component. Neck pain constitutes an extremely common health issue, with cervical spondylosis being a chronic and recurrent condition. One study showed that 60 (19.48%) of PW-ACDF still suffered persistent neck or arm pain. According to Kapetanakis's findings, neck and arm pain experienced gradual, continuous amelioration for up to one year.[7] Pain is the primary complication experienced by people with cervical spondylosis, negatively affecting their functional state and hindering participation in daily life activities. Individuals grappling with chronic pain may also encounter additional issues, such as sleep disturbances and emotional stress, which can further diminish their general HRQoL. Neck pain may also impact the future physical HRQoL of individuals, particularly for those experiencing worsening or persistent neck and arm pain. These results underscore the significance of early, effective interventions by healthcare providers and policymakers in managing neck pain to mitigate its prolonged effects on physical HRQoL. Thus, neck and arm pain can affect HRQoL in the physical component.

Dysphagia had a negative relationship with HRQoL in the physical component and the mental component. The operative level of the fusion may be related to the dysphagia's severity.[35] PW-ACDF who have experienced preoperative dysphagia also experience long periods of postoperative dysphagia and higher levels of dysphagia severity.[36] This is consistent with one study that introduced dysphagia as a significant ACDF complication. Thus, dysphagia could affect HRQoL in the physical component and the mental component. Adopting measures for protecting pharyngeal autonomic nerves while undergoing ACDF could be effective in lowering the likelihood of postoperative dysphagia.[37]

The remaining disability had a strong negative relationship with HRQoL in terms of both the physical and mental components. A study by Andrade-Ortega found unequal correlations among pain, disability, and HRQoL, primarily due to a weak correlation between alterations in pain and the changes expressed by HRQoL.[38] On the other hand, this study recognized HRQoL and disability to have a strong correlation, considering that HRQoL showed a strong linear correlation to the NDI. A significant number of individuals continued to experience limitations in neck-related physical function after surgery. Nursing care to alleviate physical discomfort can also mitigate psychological discomfort, reducing symptoms and enhancing HRQoL after surgery. Thus, a remaining disability could affect HRQoL in the physical component. A functional exercise plan can be developed to

encourage people to move early and gradually improve their self-care abilities after surgery. Implementing physical therapy and an exercise program in the early stages of ACDF surgery improves pain management.

Depression had a negative relationship with HRQoL in the physical component and the mental component. There have been associations between depression and weaker outcomes after ACDF surgery.[39] As the disease progresses, depression can worsen, further diminishing people's HRQoL. People with cervical spondylosis may experience poor HRQoL due to symptoms of their depression, including worry, tension, and self-blame. Long-term depression can impair cognitive function, and if left untreated, people may lose confidence as their physical discomfort intensifies.

Social support had a positive relationship with HRQoL in terms of the mental component. Sources of social support, including families, social and work groups, and healthcare personnel, were identified as significant factors for better everyday life experiences.[40] Enhancing social support represents a means to strengthen or improve reduced HRQoL. Hermansen found that social support provided by families and friends positively impacts PW-ACDF's everyday life.[27] These findings imply that depression, along with psychological and physical concerns, are critical factors in how an individual perceives their postoperative physical environment as well as the availability of social support.

Limitations

The current study includes the following limitations. Because the sample was made up exclusively of people discharged from one hospital, the generalizability of the findings to other hospital levels may be limited due to a lack of appropriate sample representatives. Second, the predicting factors were explored through quantitative data based on a self-report data collection, which might not have accurately represented the comprehensive experiences of participants.

Conclusions and Implications for Nursing Practice

The study demonstrates a moderate level of HRQoL among PW-ACDF in a tertiary hospital. Gender, neck and arm pain, dysphagia, depression, and remaining disability could significantly explain 46.50% of the variance in the physical component for PW-ACDF. Smoking status, gender, social support, depression, and remaining disability could explain substantially 48.40% of the variance in the mental component for PW-ACDF. It is recommended that nurses focus on reducing depression and remaining disability to improve PW-ACDF's physical component while also focusing on female gender, encouraging quitting smoking, reducing depression, paying attention to remaining disability, and providing social support to improve the mental component, leading to enhanced HRQoL. The development of nursing care programs based on these significant factors and testing their efficacy requires further studies using different samples in different locations.

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ปัจจัยทำนายคุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพในผู้ที่ได้รับการผ่าตัดเชื่อมกระดูกสันหลังระดับคอทางด้านหน้าและนำหมอนรองกระดูกออก : การศึกษาภาคตัดขวาง

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บทคัดย่อ: โรคกระดูกสันหลังระดับคอเสื่อมเป็นปัญหาสำคัญของโลก แม้ว่าการรักษาโดยการผ่าตัดเชื่อมกระดูกสันหลังระดับคอทางด้านหน้าและนำหมอนรองกระดูกออกมีประสิทธิภาพแต่ผู้ที่ได้รับการผ่าตัดชนิดนี้ ก็มีอาการคงอยู่หลายประการและส่งผลกระทบต่อคุณภาพชีวิต การที่จะพัฒนาโปรแกรมเพื่อส่งเสริมคุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพที่มีประสิทธิภาพต้องอาศัยความเข้าใจเกี่ยวกับปัจจัยที่ทำนาย การศึกษาภาคตัดขวางครั้งนี้เป็นการศึกษาคุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพในผู้ที่ได้รับการผ่าตัดผ่าตัดเชื่อมกระดูกสันหลังระดับคอทางด้านหน้าและนำหมอนรองกระดูกออกและปัจจัยทำนายองค์ประกอบด้านร่างกายและองค์ประกอบด้านจิตใจของคุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพ

กลุ่มตัวอย่าง เป็นผู้ที่อยู่ในระยะหลังผ่าตัดวัยผู้ใหญ่และวัยผู้ใหญ่ตอนปลายที่จำหน่ายจากโรงพยาบาลแล้ว จำนวน 308 รายในเมืองเซี่ยงไฮ้ สาธารณรัฐประชาชนจีน ผ่านระบบออนไลน์โดยการสุ่มตามความสะดวก โดยใช้เครื่องมือวิจัย ได้แก่ 1) แบบประเมินการกลืน 10 2) ดัชนีวัดความพร่องความสามารถของคอ 3) แบบประเมินภาวะซึมเศร้าในผู้สูงอายุแบบสั้น 4) แบบวัดการรับรู้การสนับสนุนจากสังคมหลายมิติ และ 5) แบบสอบถามภาวะสุขภาพชุดสั้น เวอร์ชัน 1 วิเคราะห์ข้อมูลด้วยสถิติเชิงพรรณนา สถิติวิเคราะห์เพียร์สัน และสถิติวิเคราะห์ถดถอยพหุคูณแบบลำดับขั้น

ผลการวิจัยพบว่าคุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพโดยรวมหลังการผ่าตัดฯ อยู่ในระดับปานกลาง ความพิการที่หลงเหลือและภาวะซึมเศร้าสามารถอธิบายความแปรปรวนองค์ประกอบทางกาย ร้อยละ 46.50 ในขณะที่การสูบบุหรี่ เพศ การสนับสนุนทางสังคม ภาวะซึมเศร้า และ ความพิการที่เหลือสามารถอธิบายแปรปรวนองค์ประกอบทางจิตใจ ร้อยละ 48.40 พยาบาลควรออกแบบโปรแกรมโดยยึดปัจจัยเหล่านี้ เพื่อช่วยให้ผู้ที่ได้รับการผ่าตัดเชื่อมกระดูกสันหลังระดับคอทางด้านหน้าและนำหมอนรองกระดูกออกเพื่อส่งเสริมคุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพทางกายและทางจิตใจของของผู้ที่ปัญหาสุขภาพดังกล่าว อย่างไรก็ตามควรมีการศึกษาซ้ำในกลุ่มตัวอย่างอื่น ๆ หลายแห่งก่อนนำไปพัฒนาโปรแกรมการดูแลต่อไป

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คำสำคัญ: คุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพ การพยาบาล การผ่าตัดเชื่อมกระดูกสันหลังระดับคอทางด้านหน้าและนำหมอนรองกระดูกออก สถิติวิเคราะห์ถดถอยพหุคูณแบบลำดับขั้น

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