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Original Article

Study on sedentary behavior and its influencing factors in elderly ovarian cancer patients during home confinement

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Abstract: Sedentary behavior is prevalent among the elderly and has become an increasingly serious public health issue. Although extensive research has been conducted on the status and risk factors of sedentary behavior in the general elderly population, the current situation and related influencing factors of sedentary behavior in elderly patients with ovarian cancer, a disease-specific group, have not been fully explored. In this study, a total of 206 elderly ovarian cancer (EOC) patients who received treatment at the First Affiliated Hospital of Zhejiang University School of Medicine from September 1, 2022, to February 28, 2025, were selected as the research subjects by convenience sampling. A cross-sectional survey was conducted using the General Information Questionnaire, Chinese Adult Sedentary Behavior Questionnaire, Social Support Rating Scale, Nutritional Risk Screening 2002, and Edmonton Symptom Assessment Scale. The influencing factors of sedentary behavior in EOC patients were analyzed by the logistic regression model and CHAID decision tree model. Among the 206 EOC patients, the average sedentary time was 7.4±3.0 h/d, and 161 patients (78.2%) had sedentary behavior (sedentary time ≥5 h/d). Logistic regression analysis and CHAID decision tree algorithm both demonstrated that social support and cancer symptom burden were the influencing factors of sedentary behavior in EOC patients ($P<0.05$). Moreover, the Chi-square Automatic Interaction Detection (CHAID) algorithm further revealed an interaction between the two factors, indicating that the social support level was the most crucial determinant. Our study reveals that sedentary behavior among EOC patients is alarmingly prevalent, necessitating urgent attention from medical professionals. Given the significant impact of social support and cancer symptom burden on this sedentary behavior, healthcare providers should proactively assess and intervene to address these influential factors, thereby mitigating the adverse consequences of excessive sedentary time for EOC patients. Decision tree and logistic regression models effectively identify sedentary behavior determinants with good predictive power. A combined approach is recommended to leverage their complementary strengths, providing a robust basis for reducing sedentary behavior in EOC patients.

Keywords: Sedentary behavior, the elderly, ovarian cancer, decision tree, influencing factors analysis, nursing care

Introduction

Ovarian cancer is a gynecological malignancy with the highest mortality rate among gynecological cancers. It is highly prevalent in elderly patients, with a five-year survival rate of 51%, posing a significant threat to women's health and lifespan [1, 2]. Therefore, enhancing the healthy life of EOC survivors has received increasing attention. However, current research on promoting healthy behaviors in EOC patients mainly focuses on physical exercise, while neglecting another unhealthy lifestyle - sedentary behavior. Sedentary behavior refers to physical activities in a sitting or lying position with an energy expenditure ≤1.5 metabolic equivalents (METs) while awake [3]. Its main forms include recreational sedentary behavior, transportation-related sedentary behavior, domestic sedentary behavior, and work - related sedentary behavior, such as sitting, lying, or reclining while using electronic devices, entertaining, chatting, reading, working, and traveling by vehicle. Sedentary behavior can lead to

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the occurrence and development of adverse health outcomes such as fall risk [4], cardiovascular diseases [5], metabolic syndrome [6], dementia [7], and depression [8]. Moreover, studies have confirmed that sedentary behavior is an independent predictor of mortality in cancer survivors [9].

According to the demographic data prediction of the World Health Organization (WHO), the global population aged 60 years and above is expected to increase from 1 billion in 2020 to 1.4 billion in 2030 and further reach 2.1 billion in 2050 [10]. According to the Ministry of Civil Affairs, the population aged 60 years and above in China was approximately 280 million in 2022, accounting for 19.8% of the total population, and it is predicted that the population aged 65 years and above will reach 334 million by 2050 [11]. Therefore, in the context of China becoming one of the countries with a severe aging problem [12], the number of EOC patients will continue to rise. Studying the current situation and influencing factors of sedentary behavior in EOC patients and implementing targeted interventions is an urgent issue for promoting healthy lives in this population. However, there is currently limited research on this topic, since most existing studies mainly focus on the sedentary behavior of the elderly in communities and nursing homes [13, 14].

EOC patients not only endure numerous complications from ovarian cancer treatment but also confront the dual challenges of aging-related debility and physical frailty. Moreover, stressors such as familial loss and social role transitions may predispose them to prolonged sedentary behavior during home convalescence. Given the disease-specific characteristics of ovarian cancer and the unique psychosomatic profiles of elderly women, we postulated that sedentary behavior among this patient group during home confinement would exceed that observed in the general elderly population (Hypothesis 1, H1).

Malnutrition remains a prevalent complication in cancer patients [15], profoundly impacting treatment outcomes. This condition not only attenuates therapeutic efficacy but also correlates with prolonged hospitalization, elevated medical expenditures, and increased mortality [16, 17]. Prior investigations have demonstrated that malnourished patients exhibit compromised exercise capacity, and heightened sedentary behavior [18]. Consequently, we hypothesized that malnutrition serves as a positive predictor of sedentary behavior in EOC patients during home-based recovery (Hypothesis 2, H2).

Social support is a positive factor that mainly affects patients' self-management ability and their perception of cancer and treatment-related symptoms. A qualitative synthesis showed that the environment, social support, and socio-cultural atmosphere are all important factors influencing sedentary behavior [19]. Patients with a high level of social support are more active in social activities, can actively cope with cancer treatment with family members or fellow patients, have a lower fear of cancer, and are more willing to participate in group activities, resulting in less sedentary time. Thus, we hypothesized that social support may be a protective factor for sedentary behavior in EOC patients during home confinement (Hypothesis 3, H3).

During cancer treatment, cancer patients face another prominent problem - cancer symptom burden, which has received widespread attention. Symptom burden refers to the number and intensity of various symptoms experienced by patients during the illness stage, causing distress to patients' physical, psychological, and spiritual aspects and seriously affecting their quality of life [20]. The symptom burden in cancer patients limits their physical activities to a certain extent. Therefore, we predicted that the cancer symptom burden of EOC patients may be a risk factor for sedentary behavior during home confinement (Hypothesis 4, H4).

The aim of this study was to investigate the current situation of sedentary behavior in EOC patients and explore the correlations between social support level, nutritional status, cancer symptom burden, and sedentary behavior in this population. Multiple regression models and decision tree models were used as analytical tools in this study to gain a deeper understanding of the influence, importance, and interactions of different factors on the sedentary behavior level of EOC patients during home confinement, so as to accurately assess their sedentary behavior status in different situations. This study aims to enhance the awareness of medical staff and EOC patients regarding sedentary behavior and provide references

and guidance for medical staff to develop targeted intervention measures.

Material and methods

Study design and participants

EOC patients who received treatment at the First Affiliated Hospital of Zhejiang University School of Medicine from September 1, 2022, to February 28, 2025, were recruited into this study by convenience sampling. Patient inclusion criteria: 1) patients with a medical diagnosis of ovarian malignant tumor, staged according to the surgical pathology of the International Federation of Gynecology and Obstetrics (FIGO); 2) patients who had undergone cytoreductive surgery for ovarian malignant tumors and completed standard chemotherapy; 3) aged between 60 and 80 years; 4) aware of their condition and able to complete the follow-up; 5) signed the informed consent form and could provide complete and accurate follow-up information. Patient exclusion criteria: 1) patients with other malignancies; 2) patients with immobility of the extremities due to paralysis, fracture, or other reasons; 3) patients with severe cognitive impairment or mental illness.

The study comprised 18 observed variables (**Table 1**), with the sample size calculated at 5 to 10 times the number of variables [21]. Accounting for a 5% to 10% non-response rate, the required sample size was estimated to be 95 to 200 participants. A total of 215 questionnaires were distributed, and 9 invalid questionnaires were excluded, resulting in 206 valid questionnaires with a response rate of 95.8%.

This study was approved by the Ethics Committee of the First Affiliated Hospital of Zhejiang University School of Medicine (No. 20250454). All participants signed the informed consent form before participation. The survey was conducted anonymously, and information confidentiality was ensured.

Data collection method and questionnaires

This study adopted a questionnaire survey method, which was completed through on-site investigation during outpatient follow-up and telephone follow-up. Before the investigation, the research team members were uniformly trained to provide clear and consistent instructions to the patients. The survey was conducted only after obtaining the patients' consent. All collected data were double-checked and entered into the system by two research team members.

General Information Questionnaire: The General Information Questionnaire was self-designed based on a literature review. Demographic data included age, marital status, educational level, place of residence, living status, medical insurance, average monthly income, BMI, occupation before retirement, and the presence of infrastructure in the community. Disease-related data included surgical pathological stage, disease course, comorbidities, bone marrow suppression, and polypharmacy.

Chinese Adult Sedentary Behavior Questionnaire: This questionnaire was developed by Tian Tian et al. in 2019 [22]. It is a self-administered closed-ended questionnaire with 10 items, used to measure sedentary time, including activities such as watching TV, using a computer/Internet, reading books, newspapers, and magazines, sitting and chatting or making phone calls, driving/taking various means of transportation, eating, hobbies, taking a short nap, sitting at work/studying, and other sitting or lying activities. The average daily time of each type of sedentary behavior = (number of days engaged in a week × average daily time spent)/7, and the total average daily sedentary behavior time is the sum of the average daily time spent on each type of sedentary behavior (excluding the time for taking a short nap). The intra-class correlation coefficient (ICC) of the questionnaire was 0.82, indicating high reliability. Referring to previous literature [23, 24], a sedentary time of ≥5 h/d was defined as the sedentary group, and <5 h/d as the non-sedentary group.

Social Support Rating Scale (SSRS): The SSRS was used to assess patients' social support level [25]. The scale consists of 3 dimensions, namely objective support, subjective support, and utilization of support, with a total of 10 items. For items 1-4 and 8-10, only one option can be selected, and options 1, 2, 3, and 4 are assigned scores of 1, 2, 3, and 4, respectively. Item 5 has 5 options (A, B, C, D, E), and the total score is calculated, with each option representing a score from 1 (none) to 4 (full support).

Table 1. Comparison of sedentary behavior characteristics and univariate analysis in EOC patients during home confinement (n=206)

Item	Sedentary Time (h/d)	Number	With Sedentary Behavior (n=161)	Without Sedentary Behavior (n=45)	Test Statistic	*P* value
Marital status, n (%)					7.593[a]	0.006
Married	7.1±2.9	182	137 (85.1)	45 (100.0)		
Other (Divorced, or widowed)	9.8±3.1	24	24 (14.9)	0 (0.0)		
Educational Level, n (%)					4.071[a]	0.044
Primary School and Below	8.1±3.1	123	102 (63.4)	21 (46.7)		
Middle School and Above	6.3±2.5	83	59 (36.6)	24 (56.3)		
Place of Residence, n (%)					0.969[a]	0.325
Urban	7.0±2.9	92	69 (42.9)	23 (51.1)		
Rural	7.7±3.0	114	92 (57.9)	22 (48.9)		
Living Situation, n (%)					-[c]	0.588
Lonely	7.3±3.2	5	5 (3.1)	0 (0.0)		
Non-Lonely	7.4±3.0	201	156 (96.9)	45 (100.0)		
Community infrastructure, n (%)					-[c]	0.571
None	7.2±2.9	19	14 (8.7)	5 (11.1)		
Yes	7.4±3.0	187	147 (91.3)	40 (88.9)		
Pre-retirement Occupation, n (%)					13.541[a]	0.004
Farmer	8.3±3.1	73	64 (39.8)	9 (20.0)		
Worker	7.1±3.0	85	54 (35.4)	28 (62.2)		
Cadre	6.4±2.4	41	33 (20.5)	8 (17.8)		
Unemployed	7.8±2.2	7	7 (4.3)	0 (0.0)		
Average Monthly Income, n (%)					13.743[a]	0.001
<2000	8.2±2.9	109	96 (59.8)	13 (28.9)		
2000-5000	6.9±3.0	78	53 (32.9)	25 (55.6)		
>5000	5.0±2.1	19	12 (7.5)	7 (15.6)		
Medical Insurance, n (%)					-[c]	0.525
None	6.3±2.5	3	2 (1.2)	1 (2.2)		
Yes	7.4±3.0	203	159 (98.8)	44 (97.8)		
BMI, n (%)					2.911[a]	0.233
Underweight	7.1±3.3	34	23 (14.3)	11 (24.4)		
Normal	7.4±3.0	157	125 (77.6)	32 (71.1)		
Overweight	7.6±2.8	15	13 (8.1)	2 (8.1)		
Disease Course (month), n (%)					3.745[a]	0.154
<12	7.2±2.4	20	13 (8.1)	7 (15.6)		
12-24	6.7±2.7	100	76 (47.2)	24 (53.3)		
>24	8.2±3.3	86	72 (44.7)	14 (31.1)		
Comorbid Chronic Diseases, n (%)					2.104[a]	0.147
<3	7.1±2.9	142	107 (66.5)	35 (77.8)		
≥3	8.1±3.2	64	54 (33.5)	10 (22.2)		
Multiple Medications, n (%)					3.201[a]	0.074
≤4	6.9±2.7	158	119 (73.9)	39 (86.7)		
≥5	9.0±3.3	48	42 (26.1)	6 (13.3)		
Bone Marrow Suppression, n (%)					1.524[a]	0.217
None	6.8±2.6	160	122 (75.8)	38 (84.4)		
Yes	9.5±3.4	46	39 (24.2)	7 (15.6)		
Pathological Stage, n (%)					0.669[c]	0.881
I	6.6±2.6	12	9 (5.6)	3 (6.7)		
II	7.1±2.3	8	6 (3.7)	2 (4.4)		
III	7.9±3.2	43	35 (21.7)	8 (17.8)		
IV	7.3±3.0	143	111 (68.9)	32 (71.1)		

Nutritional Status, n (%)					16.512[a]	<0.001
Good	6.4±2.6	141	99 (61.5)	42 (93.3)		
Poor	9.5±2.9	65	62 (38.5)	3 (4.7)		
Age [Years, M (P_{25}, P_{75})]		206	67 (61, 73)	66 (60, 70)	1.607	0.108
Social Support Score [Points, M (P_{25}, P_{75})]		206	30 (26, 31)	38 (35.5, 41.5)	7.500[b]	<0.001
Edmonton Symptom Score [Points, M (P_{25}, P_{75})]		206	26 (12.5, 40)	2 (0, 20.5)	6.135[b]	<0.001

[a]Chi-square test; [b]Mann-Whitney U test; [c]Fisher's exact test.

Items 6 and 7 are scored 0 if there is no source, and the score is equal to the number of sources otherwise. A higher score indicates a higher level of social support. A total score ≤22 is considered a low level, 23-44 a medium level, and 45-66 a high level. The Cronbach's α coefficient of the scale was 0.896.

Nutritional Risk Screening 2002 (NRS-2002): The NRS-2002 was developed by Kondrup et al. [26] in 2003 to assess an individual's nutritional risk status. The scale includes two aspects: nutritional status score (anthropometric measurements, recent weight changes, and dietary intake) and disease severity score, with a total of 6 items. "No" is scored 0, and "Yes" is scored 1. If the age ≥70 years, an additional 1 point is added, with a total score ranging from 0 to 7. A score of 0-2 indicates normal nutrition, 3-4 indicates a nutritional risk, and 5-7 indicates malnutrition. A higher score indicates a worse nutritional status. The Cronbach's α coefficient of the scale was 0.760, and the criterion-related validity was 0.670.

Edmonton Symptom Assessment Scale (ESAS): The ESAS was used to evaluate the level of cancer symptom burden in patients [27]. It assesses 9 established symptoms and 1 other severe symptom, including pain, fatigue, drowsiness, nausea, loss of appetite, shortness of breath, depression, anxiety, and decreased well-being, mainly reflecting the patient's physical, psychological, and well-being status. Each item uses a 0-10 numerical rating scale, where 0 indicates no symptoms and 10 indicates the most severe degree imaginable. A higher number indicates more severe symptoms. The Cronbach's α coefficient of the scale was 0.720.

Statistical analysis

The Epidate 3.1 software was used to establish the database, and data were entered by two people using two separate computers. Statistical analysis was performed using IBM SPSS 26.0 and R 4.4.3. For variables of measurement data that followed a normal distribution, the data were expressed as mean ± standard deviation, and the independent-samples t-test was used. For variables that did not follow a normal distribution, the median and interquartile range were used, and the Mann-Whitney U test was applied. Enumeration data were described using frequency and percentage, and analyzed using the chi-square test or Fisher's exact test. Variables with a significance level of $P<0.1$ in the univariate analysis were selected as independent variables, and the presence or absence of sedentary behavior was used as the dependent variable. Firth logistic regression analysis was performed. This method provides a robust alternative to traditional maximum-likelihood logistic regression for analyzing rare events. In addition, as an alternative model, the CHAID algorithm was used to construct a decision tree model. Similar to the Firth logistic regression model, only variables with a significance level of $P<0.1$ were selected in the decision tree analysis. The maximum tree depth was set to 3 levels. Due to the limited number of events and samples, the minimum number of cases in the parent and child nodes was set to 50 and 20, respectively. The receiver operating characteristic (ROC) curve was used to visualize the prediction performance of the model, and the model efficacy was evaluated by calculating the sensitivity, specificity, Youden's index, area under the curve (AUC), and its 95% confidence interval (CI). A two-tailed $P<0.05$ was considered statistically significant.

Results

General characteristics of EOC patients

A total of 206 EOC patients were included in this survey. The mean sedentary time among the 206 EOC patients was 7.4±3.0 h/d, and 161 patients (78.2%) were identified as having

sedentary behavior (defined as sedentary time ≥5 h/d). The majority (88.3%) of patients were married; 59.7% had completed primary education or below; 55.3% resided in rural areas; the vast majority (96.6%) lived in non-solitary situations; 90.8% of the communities had infrastructure. The largest occupational group before retirement was cadres (41.3%), while the smallest was unemployed individuals (3.4%). Most patients (52.9%) had an average monthly income of less than 2000 yuan; 98.5% were covered by medical insurance; and the majority (76.2%) had a normal body weight. The disease course was 12-24 months in 48.5% of patients; most (68.9%) had fewer than 3 comorbidities; 76.7% had no polypharmacy; 77.7% had no bone marrow suppression; and 69.4% were at pathological stage IV. Comparisons between the sedentary group and non-sedentary group of EOC patients showed that there was no statistically significant difference in age, place of residence, living situation, community infrastructure, medical insurance, BMI, disease course, comorbid chronic diseases, multiple medications, bone marrow suppression, and pathological stage (P>0.05); while statistically significant differences were observed in marital status, educational level, pre-retirement occupation, average monthly income, nutritional status, social support score, and Edmonton symptom score (P<0.05).

The dependent variable was the presence of sedentary behavior. Univariate analysis showed that other marital status (including divorced or widowed) [odds ratio (OR): 16.28, 95% CI 2.18-2079.74, P=0.002], malnutrition (OR: 7.61, 95% CI 2.77-28.79, P<0.001), and Edmonton symptom score (OR: 1.08, 95% CI 1.05-1.13, P<0.001) were risk factors for sedentary behavior in EOC patients during home confinement. Protective factors included middle school or above (OR: 0.51, 95% CI 0.26-0.99, P=0.045) compared to primary school and below, pre-retirement occupation as worker (OR: 0.30, 95% CI 0.13-0.65, P=0.002) compared to farmer, average monthly income of 2000-5000 yuan (OR: 0.29, 95% CI 0.14-0.61, P<0.001), more than 5000 yuan (OR: 0.23, 95% CI 0.08-0.70, P=0.01) compared to less than 2000 yuan, and social support score (OR: 0.79, 95% CI 0.73-0.84, P<0.001). The likelihood ratio test showed the model was statistically significant (χ^2=73.06, P<0.001) (**Table 1**).

Logistic regression analysis of influencing factors of sedentary behavior in EOC patients

In this study, since Perfect/Quasi-Complete Separation was present in marital status, living situation, and pre-retirement occupation, the traditional logistic regression using Maximum Likelihood Estimation (MLE) would produce substantially biased coefficient estimates with unreliable standard errors. Therefore, we employed Firth logistic regression, which incorporates Penalized Likelihood Estimation by adding a penalty term to the likelihood function. This approach prevents coefficients from diverging to infinity and yields finite, stable parameter estimates. Variables with P<0.1 in the univariate analysis were included in the multivariate Firth logistic regression model, and a total of 7 variables were included. The multivariate analysis results showed that Social Support Score (OR: 0.85, 95% CI 0.78-0.92, P<0.001) was a protective factor for negative sedentary behavior in EOC patients during home confinement; Edmonton symptom score (OR: 1.04, 95% CI 1.01-1.08, P=0.02) was a risk factor for sedentary behavior in EOC patients during home confinement.

On the other hand, in both univariate and multivariate models, place of residence, living situation, community infrastructure, medical insurance type, body weight, disease course, comorbid chronic diseases, polypharmacy, bone marrow suppression, and pathological stage were not found to be significant influencing factors for sedentary behavior in EOC patients during home confinement (**Table 2**).

Decision tree CHAID algorithm analysis of influencing factors of sedentary behavior in EOC patients

The decision tree model included 2 factors found to be statistically significant in the univariate analysis. The generated terminal decision tree model is shown (**Figure 2**), including 2 layers of decision tree growth, a total of 5 nodes, of which 3 are terminal nodes, and 2 explanatory variables, Social Support Score and Edmonton symptom score, are screened out. The first layer is Social Support Score, indicating that Social Support Score is most correlated with the occurrence of sedentary behavior in EOC patients during home confinement. The probability of sedentary behavior in EOC

Table 2. Logistic regression analysis of sedentary behavior characteristics in EOC patients during home confinement

Variable	Univariate Analysis				Multivariate Analysis			
	OR	95% CI		P	OR	95% CI		P
Marital status								
Married	ref				ref			
Other (Divorced, or widowed)	16.28	2.18	2079.74	0.002	8.25	0.88	1107.65	0.07
Education level								
Primary School and Below	ref				ref			
Middle School and Above	0.51	0.26	0.99	0.045	1.52	0.55	4.48	0.42
Place of Residence								
Urban	ref							
Rural	1.39	0.72	2.69	0.33				
Living Situation								
Lonely	ref							
Non-Lonely	0.31	0.00	2.83	0.36				
Community infrastructure								
None	ref							
Yes	1.38	0.45	3.74	0.55				
Pre-retirement Occupation								
Farmer	ref				ref			
Worker	0.30	0.13	0.65	0.002	0.68	0.22	2.05	0.49
Cadre	0.58	0.21	1.63	0.297	2.69	0.45	19.69	0.28
Unemployed	2.20	0.23	295.89	0.558	4.62	0.38	658.52	0.26
Average Monthly Income								
<2000	ref				ref			
2000-5000	0.29	0.14	0.61	<0.001	0.79	0.25	2.46	0.67
>5000	0.23	0.08	0.70	0.01	0.33	0.04	2.53	0.28
Medical Insurance								
None	ref							
Yes	2.16	0.19	16.61	0.48				
BMI								
Underweight	ref							
Normal	1.90	0.83	4.18	0.13				
Overweight	2.64	0.64	15.18	0.19				
Disease Course (month)								
<12	ref							
12-24	1.73	0.61	4.66	0.29				
>24	2.77	0.94	7.92	0.06				
Comorbid Chronic Diseases								
<3	ref							
≥3	1.72	0.83	3.82	0.15				
Multiple Medications								
≤4	ref							
≥5	2.16	0.93	5.75	0.075				
Bone Marrow Suppression								
None	ref							
Yes	1.65	0.73	4.18	0.23				

Pathological Stage								
I	ref							
II	0.96	0.14	7.24	0.96				
III	1.54	0.33	6.23	0.56				
IV	1.26	0.30	4.26	0.72				
Nutritional Status								
Good	ref				ref			
Poor	7.61	2.77	28.79	<0.001	1.60	0.44	7.03	0.48
Age	1.05	0.99	1.11	0.10				
Social Support Score	0.79	0.73	0.84	<0.001	0.85	0.78	0.92	<0.001
Edmonton symptom score	1.08	1.05	1.13	<0.001	1.04	1.01	1.08	0.02

patients with Social Support Score ≤31 points during home confinement was 96.1%, and the probability of sedentary behavior in EOC patients with Social Support Score >31 points was 49.4%. In the subgroup with Social Support Score >31 points, affected by Edmonton symptom score, the probability of sedentary behavior in EOC patients with Edmonton symptom score ≤4 points during home confinement was 30.3%; the probability of sedentary behavior in EOC patients with Edmonton symptom score >4 was 63.0% (**Figure 1**).

Efficacy comparison between logistic regression model and decision tree model

As shown in **Figure 2** and **Table 3**, the AUC of the decision tree model for risk classification of sedentary behavior in EOC patients during home confinement was 0.858, Youden's index was 0.647, sensitivity was 75.8%, and specificity was 88.9%. The AUC of the Firth logistic regression model was 0.896, Youden's index was 0.686, sensitivity was 86.3%, and specificity was 82.2%. The AUCs of the two models were similar, and the DeLong test result was Z=1.801, P=0.072, indicating that the evaluation efficacy of the Firth logistic regression model and the Decision Tree model was comparable. The regression model had higher sensitivity, while the decision tree model had higher specificity. The combined use of the two models can make better use of their advantages and help determine the factors affecting the sedentary behavior of EOC patients during home confinement.

Discussion

In this cross-sectional study, 206 EOC patients were evaluated, demonstrating a mean sedentary duration of 7.4±3.0 h/d - significantly higher than that reported for community-dwelling older adults [13, 14]. When compared with patients with other chronic conditions, EOC patients exhibited longer sedentary time than those with stable chronic obstructive pulmonary disease (7.14±2.53 h/d) [28] and maintenance hemodialysis patients (6.31 [5.69, 7.14] h/d) [29]. These findings align with our primary hypothesis (H1), highlighting the distinct sedentary behavior pattern in EOC patients relative to both healthy elderly populations and other patient cohorts.

The elevated sedentary behavior observed in ovarian cancer patients is likely attributable to the disease's treatment regimen. Ovarian cancer patients typically undergo surgery and chemotherapy as first-line treatments, complemented by targeted drug maintenance therapy. While these interventions are essential for disease control, they often entail surgical complications and chemotherapy-induced side effects, such as gastrointestinal and hematological toxicities, which compromise physical function. This functional impairment may in turn drive EOC patients to adopt sedentary behaviors as a compensatory mechanism. In this study, 46 patients (22.3%) had bone marrow suppression, with a sedentary time of 9.5±3.4 h/d; 65 patients (31.6%) had malnutrition, with a sedentary time of 9.5±2.9 h/d. Another plausible explanation is the study's all-female sample, as women may exhibit greater emotional vulnerability than men - traits that render them more susceptible to disease-induced anxiety, psychological burden, and social withdrawal, thereby promoting sedentary behavior [30, 31]. These findings underscore the need for healthcare providers to prioritize assessment of sedentary behavior in EOC

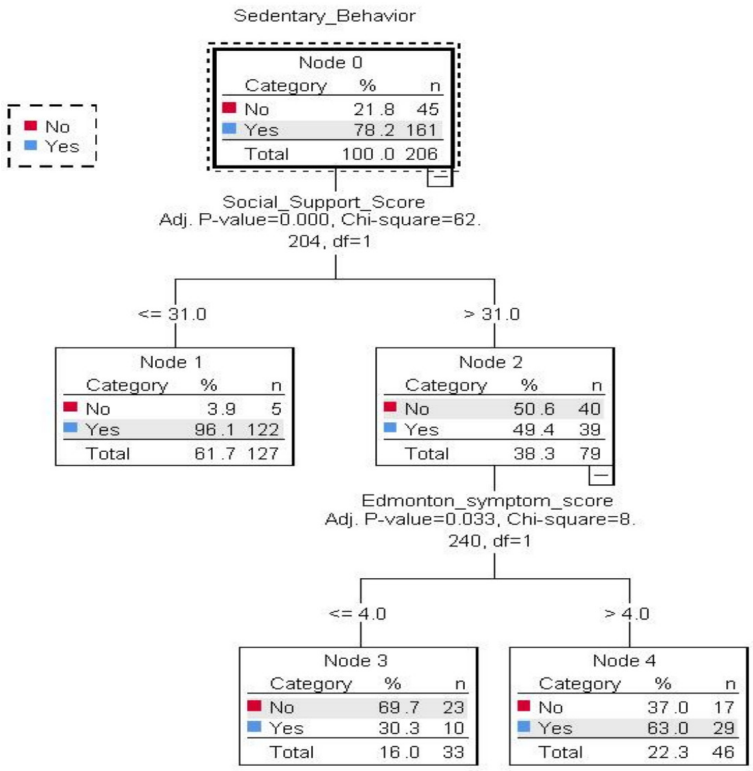

Figure 1. Decision tree for risk classification of sedentary behavior in EOC patients during home confinement.

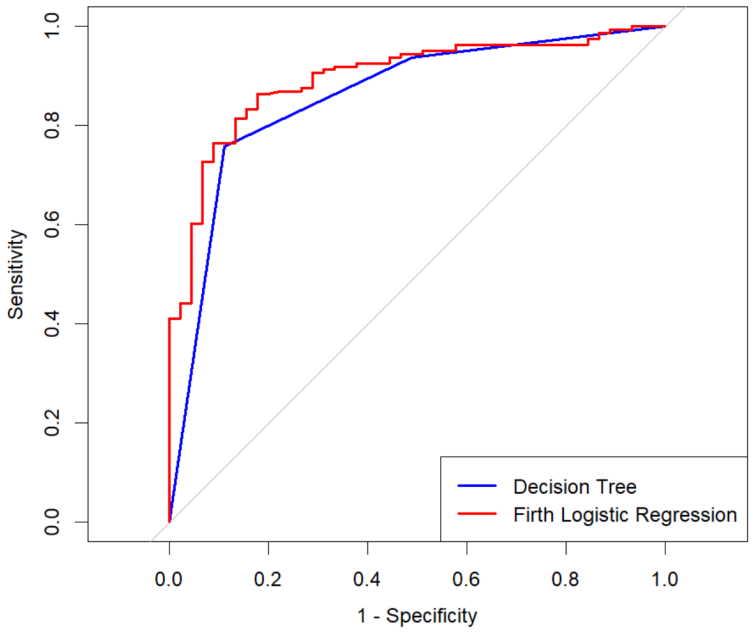

Figure 2. Working characteristic curves of sedentary behavior in EOC patients in firth logistic regression model and decision tree model.

patients and implement multidisciplinary, gender-tailored interventions to mitigate its impact.

This study employed logistic regression model and the CHAID decision tree algorithm to identify social support level and cancer symptom burden as significant determinants of sedentary behavior among EOC patients. Specifically, social support emerged as a protective factor, while cancer symptom burden was identified as a risk factor, aligning with our hypotheses H3 and H4. Contrarily, malnutrition did not significantly influence sedentary behavior, contradicting hypothesis H2. Notably, social support was determined to be the most influential factor, consistent with previous findings by Stapleton JN et al. [32]. The underlying reasons may be attributed to the social withdrawal commonly observed in cancer patients [33, 34]. Lower social support exacerbates social isolation, reducing engagement in social activities and promoting sedentary behavior. Conversely, higher social support mitigates sedentary time through dual pathways: behavioral guidance and psychological motivation. High social support enhances patients' self-efficacy [35], encouraging active participation in physical activities. Additionally, patients with robust social networks are more likely to engage in companion-supported activities, such as family-led walks or group exercise sessions [36], which directly reduce sedentary time. Family members providing high levels of social support often assist in exercise planning and transportation arrangements [37], facilitating regular outdoor activities, such as daily 30-minute sessions of moderate-intensity exercises like tai chi or baduanjin. Educational interventions from healthcare providers or support groups regarding the

Table 3. ROC curve parameters of decision tree model and firth logistic regression model for the risk of sedentary behavior in EOC patients

Model	AUC	SE	95% CI	Sensitivity	Specificity	*Z*	*P*
Decision Tree	0.858	0.03	0.798-0.917	0.758	0.889	1.801	0.072
Firth logistic regression	0.896	0.02	0.847-0.944	0.863	0.822		

detrimental effects of sedentary behavior may significantly enhance patients' awareness and reduce sedentary time to a certain extent. Integrating multifaceted social support strategies including emotional support through family-encouraged exercise, information support via remote reminders, and wearable devices for sedentary time monitoring, along with lifestyle modifications (e.g., substituting sedentary activities with walking, establishing regular exercise routines) can effectively reduce sedentary duration, thereby promoting holistic physical and mental well-being among EOC patients [38, 39].

EOC patients with a higher cancer symptom burden exhibit a pronounced propensity for sedentary behavior, with symptom burden exacerbating sedentariness through both physiological and psychological pathways. Physiologically, cancer-related physical symptoms directly constrain physical activity via functional impairment [40]. Studies have identified pain, fatigue, and dyspnea as the primary limitations to mobility [41], with their severity - stemming from disease progression or treatment - showing a dose-dependent association with sedentary duration. For instance, chemotherapy-induced mucositis leads to dysphagia and malnutrition, reducing basal metabolic rate and accelerating skeletal muscle protein breakdown; this ultimately forces patients to extend sedentary time due to sarcopenia. Ovarian cancer chemotherapy regimens, particularly agents like paclitaxel, induce peripheral neuropathy in 30%-68% of patients, causing limb numbness or pain that significantly diminishes walking endurance [42, 43]. Targeted therapies (e.g., anti-angiogenic drugs) may trigger hypertension or proteinuria, while immune checkpoint inhibitors commonly induce fatigue syndrome (15%-25% incidence) with persistent effects, both of which compel patients to reduce activity due to dizziness or exhaustion. Psychologically, the symptom burden amplifies sedentary behavior through a vicious cycle: physical discomfort prompts social withdrawal and reduced motivation for activity, which in turn weakens physical function and exacerbates symptoms. This creates a self-reinforcing loop of *symptom-induced sedentariness, functional decline and symptom exacerbation*, further entrenching sedentary habits.

The logistic regression and decision tree models constructed in this study exhibited robust predictive performance for sedentary behavior. The decision tree model yielded an AUC of 0.858, Youden's index of 0.647, sensitivity of 75.8%, and specificity of 88.9%; conversely, the logistic regression model demonstrated a higher AUC of 0.896, Youden's index of 0.686, sensitivity of 86.3%, and specificity of 82.2%. These models offer complementary advantages: the decision tree, a non-parametric approach effectively captures variable interactions, mitigates collinearity, and presents results intuitively via tree diagrams, whereas the logistic regression model quantifies ORs for risk factors and clarifies the quantitative dependency between independent and dependent variables, though with less visual intuitiveness than the decision tree [44]. Thus, model selection should not solely rely on individual merits but integrate both methods to maximize their strengths. Our findings further indicate that EOC patients with high social support scores (>31 points) but severe cancer symptom burden (>4 points) exhibit a 63.0% probability of sedentary behavior during home convalescence. This highlights the need for healthcare providers to address the impact of cancer symptom burden, which may be mitigated through strategies such as pharmacological symptomatic support, traditional Chinese medicine therapies, and cognitive-behavioral interventions [45].

The present study has several limitations that may affect its generalizability. First, the sample size was relatively small and the study was conducted at a single center. Future research should consider multi-center designs with expanded sample sizes to enhance external

validity. Second, all data were collected using self-reported measures, which may introduce information bias. These limitations highlight the need for further investigation in subsequent studies.

In conclusion, sedentary behavior is prevalent among EOC patients. The decision tree and logistic regression models developed in this study identified social support as a protective factor and cancer symptom burden as a risk factor for sedentary behavior, demonstrating good predictive performance. Integrating these two models allows for a more comprehensive analysis of influencing factors, providing a robust basis for developing targeted interventions to reduce sedentary behavior and improve outcomes in EOC patients.

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Disclosure of conflict of interest

None.

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