Research Paper

Study on Factors Influencing Dysphagia in Elderly Patients with Chronic Obstructive Pulmonary Disease Based on Structural Equation Modeling

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Dysphagia can occur in elderly patients with chronic obstructive pulmonary disease due to poor coordination between breathing and swallowing. Dysphagia can not only lead to aspiration pneumonia and acute exacerbation of chronic obstructive pulmonary disease, but also increase the risk of death. Previous studies only analyzed the influencing factors, but did not explore the interaction and size of the influencing factors, and there is still a lack of epidemiological investigation of dysphagia in chronic obstructive pulmonary disease patients in China. This study investigated the current situation of dysphagia in patients with chronic obstructive pulmonary disease in elderly chronic obstructive pulmonary disease patients in China, and used structural equation model to explore the direct and indirect effects of influencing factors. From April 2019 to April 2020, 1020 elderly chronic obstructive pulmonary disease patients who met the inclusion and exclusion criteria in the department of respiratory Medicine in 9 tertiary hospitals in Ningxia were selected as study subjects. The data were collected through questionnaires, including general information, chronic obstructive pulmonary disease Assessment Test, Activities of Daily Living, Geriatric Depression Scale, The Mini Nutritional Assessment-Short Form, FRAIL assessment scale, and Water Swallowing Test. On the basis of exploratory factor analysis, Amos was used to construct the initial model in combination with literature and professional knowledge, and the overall fitting evaluation and modification of the model were carried out to construct the final model. The incidence of Dysphagia in patients with chronic obstructive pulmonary disease in elderly chronic obstructive pulmonary disease patients was 19.71 %. The modified structural equation model fitted well, and the comprehensive condition of the elderly, smoking condition and comorbidities directly affects the dysphagia (the effect values respectively were 0.372, 0.112 and 0.095).The disease condition not only directly affects dysphagia, but also influences it through the comprehensive condition of the elderly (direct effect 0.109, indirect effect 0.109, total effect 0.218); age factors not only directly affects dysphagia, but also influences it through The disease condition and comprehensive condition of the elderly (direct effect 0.113, indirect effect 0.183 and total effect 0.296). eating condition not only directly affects dysphagia, but also influences it through comprehensive condition of the elderly (direct effect 0.127, indirect effect 0.074, total effect 0.201). The comprehensive condition of the elderly, smoking status and comorbidities directly affects the swallowing function, and the effect value of comprehensive condition of the elderly on swallowing function is 0.372. The disease status, age factors and eating status not only directly affect swallowing function, but also indirectly affect it through other factors.

Key words: Chronic obstructive pulmonary disease, swallowing function, influencing factors, structural equation model

According to the latest data released by the National Bureau of Statistics in 2018, there are about 240 million people aged 60 and above in China. As the aging of the population becomes more and more serious, the Blue Book on Aging Health: China's Aging Health Report (2018) mentions that healthy aging is the only way for

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China to actively respond to the aging of the population. Smukalla *et al.*[1,2] showed that the degeneration of muscle tissues in the oral, pharynx and esophagus in the elderly and degeneration of various functions such as poor age factor and decreased salivary secretion can lead to dysphagia, which has become one of the important factors affecting the health of the elderly.

In addition to age, the disease itself can cause dysphagia. Stroke and chronic obstructive pulmonary disease (COPD) are common diseases that cause dysphagia in the elderly[3]. There have been relevant studies on dysphagia in stroke patients both in China and Abroad. The Guidelines for Rehabilitation of Adult Stroke released in 2016 in the United States introduced the process of screening, intervention and management of dysphagia[4]. As for dysphagia in COPD patients, no systematic management guidelines have been found.

COPD is a chronic disease characterized by persistent airflow limitation. Studies have shown that dysphagia can result from chronic cough, therapeutic inhalation of bronchodilators, and poor coordination between breathing and swallowing[5-8] Lindroos *et al.*[9] reported that the incidence of dysphagia in COPD patients in Helsinki, Finland was 11.8 %; Gonzalez *et al.*[10] reported that 78 % of Swedish COPD patients had dysphagia of different degrees. Macri *et al.*[11] reported that the incidence of dysphagia in British COPD patients was 26.5 %. However, there is a lack of epidemiological investigation of dysphagia in COPD patients in China.

Dysphagia can lead to aspiration pneumonia, acute exacerbation of COPD and increase the risk of death[9,12,13]. Studies have shown that management of influencing factors can effectively improve patients' swallowing function[14]. Yoshimatsu *et al.*[3,15,16] using Logistic regression to explore the influence factors of swallowing disorder in that age, the condition of teeth and depression are the influence factors of swallowing disorder and mentioned condition, the condition of disease and chronic diseases will affect its, however, these indicators cannot be directly measured variables (latent variable), conventional regression analysis method is difficult to deal with these factors, At the same time, regression analysis takes whether the independent variable has direct effect on the dependent variable as the estimation goal, and does not consider the internal interaction of the independent variable. Structural equation model is the synthesis of factor analysis and path analysis, which can make up for the deficiency of traditional methods.

Therefore, the purpose of this study was to understand the current situation of dysphagia in elderly COPD patients in China and to use structural equation model to explore the direct and indirect effects of influencing factors, so as to provide a basis for formulating intervention measures for dysphagia.

PATIENTS AND METHODS

Patients:

From April 2019 to April 2020, a cross-sectional survey was conducted on COPD patients in 9 level-III hospitals (3 Level-III Level-A hospitals and 6 Level-III Level-B hospitals) in Ningxia.

In this study, COPD patients meeting the following: Inclusion criteria: (1) age≥60 years, (2) being diagnosed with COPD by a physician, (3) Clear consciousness, No cognitive impairment, able to understand and execute simple instructions of researchers and able to communicate effectively, (4) Informed consent and voluntary participation in this study. Exclusion criteria: (1) patients with other swallowing disorders (stroke, Parkinson's disease, head and neck tumors, esophageal cancer, etc.), (2) those who must fast from water.

Measures:

Through literature review and combined with clinical practice, relevant factors affecting swallowing disorders in elderly COPD patients were collected, mainly including individual characteristics, chronic disease, overall status, disease status, smoking status and eating status, etc., and a questionnaire was designed on this basis, the researchers conducted a preliminary survey of 48 elderly patients with COPD and improved the questionnaire. The investigator of each hospital shall be trained uniformly (Investigators having worked in respiratory medicine department for 5 y or more, having bachelor's degree and above with the qualification certificate of supervisor nurse, having questionnaire investigation experience). The training contents shall include the research purpose, research contents, questionnaire filling requirements and evaluation methods of Water Swallowing Test (WST); ask the patient about each item of the questionnaire and fill out each item according to the patient's answers. Check if there is any missing item, take it back after checking. General information was collected including sex, age, occupation, marital status, educational level, living style, number of teeth missing, etc.

COPD Assessment Test (CAT) scale used to assess the severity of COPD. Proposed by Jones on the basis of

the St George Respiratory Questionnaire (SGRQ) in 2009, it has proven to have good test characteristics in a Chinese population[17] Includes 8 questions. The total score is 40 points, with the total score<10 indicating mild illness, 10<total score≤20 indicating moderate illness, 20<total score≤30 indicating serious illness, and>30 indicating very serious illness[18-20].

Activities of Daily Living (ADL) are used to evaluate patients' ability of Daily Living Activities. It was first published in 1965 by Dorothy Barthel and Florence Mahone, and it was verified to have good test characteristics among Chinese people[21] includes 10 items. The total score is 100 points, and the evaluation standard is: 81~100 points, life completely self-care. 61~80 points, mild dysfunction, able to complete daily activities independently; 41~60 points, moderate dysfunction, need help in life≤40 points, severely dysfunctional or totally dependent, most daily activities cannot be completed or require human care[22].

The Geriatric Depression Scale (GDS) is a measure of Depression in the elderly over the last 1 w. Prepared by Brink Equal in 1982, proved to have good test characteristics in The Chinese population[23] includes 30 entries. The total score is 30 and the assessment standard is: 0~10 is normal, that is no depression; 11 to 20 are classified as likely to have depressive symptoms; Between 21 and 30 is classified as depression[24].

The Mini Nutritional Assessment-Short Form (MNA-SF) is designed to evaluate Nutritional status. In 2001, it was proposed by Rubenstein *et al.* on the basis of Mini Nutritional Assessment (MNA) and verified to have good testing characteristics in Chinese population[25] includes 8 questions. With a total score of 14, 12 to 14 is classified as normal nutritional status, 8 to 11 as at risk of malnutrition and 0 to 7 as undernourished[26].

FRAIL assessment scale is used to assess the FRAIL situation of the elderly. It was proposed in 2008 by experts from the International Working Group on Nutrition and Aging and verified to have good testing characteristics in Chinese population[27] includes 5 questions. The assessment criteria were as follows≥3 could be diagnosed as frailty<3 were prophase of asthenia; There were 0 healthy elderly people without weakness[28-30].

Water Swallowing Test (WST) Used for evaluate swallowing function. In 1982, it was proposed by Japanese scholar Toshio Lowa and verified to have good test characteristics in Chinese population[31]. Let the patient drink 3~5 ml of warm boiled water at a time. If there is no discomfort, ask the patient to drink 30ml of warm boiled water as usual, and observe the required time and cough. Can be smoothly once swallowed water level for I; Above points 2 times cannot choke to cough to swallow a category II; Can one swallow but there are choke to cough for III level; Above points 2 times to swallow but have a choking cough for IV level; Frequent cough, not all swallowed is Grade V. Evaluation criteria: I level, 5 seconds after drinking 30 ml warm water to normal; I level, more than 5 seconds after drinking 30 ml warm water or II level for suspicious; Abnormal III~V level[32].

Ethical considerations:

This study was approved by the ethics review institution of The General Hospital of Ningxia Medical University (2020-643), which complied with complied with the declaration of Helsinki. Prior to data collection, consent and cooperation were obtained from 9 hospital administrators and departments, and all subjects signed written informed consent.

Data analysis:

Epidata 3.1 was used for data entry, and SPSS 22.0 was used for data processing and exploratory factor analysis. Measurement data were described by median and quartile, while counting data were described by frequency and percentage. The measurement data of the two groups were compared by mann-Whitney U test, the grading data were compared by Wilcoxon W test, and the counting data were compared by χ^2 test. AMOS 25.0 software was used to fit, evaluate and modify the model, establish the final model, and explore the path coefficient among variables. In all analyses, statistical significance was set at $p<0.05$.

RESULTS AND DISCUSSION

A total of 1068 questionnaires were issued in this survey, and 1020 valid questionnaires were recovered, with an effective recovery rate of 95.51 %. The general information of patients (Table 1). There were 819 patients without dysphagia, accounting for 80.29 %; 201 patients of dysphagia, accounting for 19.71 %. 1) is the $\chi 2$ test; 2) is the Z value.

Through exploratory factor analysis, the common factors were extracted to find the significant variables that affect the latent variables of swallowing disorders in elderly COPD patients. Demographic information, disease-related variables, depression status, Weak condition, nutritional status, daily living ability, CAT score,

TABLE 1: COMPARISON OF SWALLOWING FUNCTION OF ELDERLY COPD PATIENTS WITH DIFFERENT CHARACTERISTICS [N (%)]

Characteristics	N	Nondysphagia n=819	Dysphagia n=201	x^2/ Z	p
Sex					
Male	622	494 (60.32)	128 (63.68)	0.768[1)]	0.381
Female	398	325 (39.68)	73 (36.32)		
Age					
60~69	399	350 (42.74)	49 (24.38)		
70~79	414	320 (39.07)	94 (46.77)	25.299[1)]	<0.001
≥80	207	149 (18.19)	58 (28.86)		
Teeth missing		2 (0, 9)	6 (0, 18)	-3.174[1)]	0.002
Can attention to eating					
Yes	846	708 (86.45)	138 (68.66)	36.101[1)]	<0.001
No	174	111 (13.55)	63 (31.34)		
Eating position					
Sitting upright	857	713 (87.06)	144 (71.64)	28.565[1)]	<0.001
half lying position	163	106 (12.94)	57 (28.36)		
Hypertension					
No	597	505 (61.66)	92 (45.77)	16.787[1)]	<0.001
Yes	423	314 (38.34)	109 (54.23)		
Diabetes					
No	808	676 (82.54)	132 (65.67)	27.891[1)]	<0.001
Yes	212	143 (17.46)	69 (34.33)		
Coronary heart disease (CHD)					
No	771	627 (76.56)	144 (71.64)	2.113[1)]	0.146
Yes	249	192 (23.44)	57 (28.36)		
Smoking history					
Never smoking	572	471 (57.51)	101 (50.25)		
To give up smoking	386	303 (37.00)	83 (41.29)	4.636[1)]	0.098
smoking	62	45 (5.49)	17 (8.46)		
Cough					
No cough	106	100 (12.21)	6 (2.99)		
Cough is lighter	657	541 (66.06)	116 (57.71)	34.734	<0.001
Cough is worse than usual	257	178 (21.73)	79 (39.30)		
Sputum					
No sputum	108	107 (13.06)	1 (0.50)		
Sputum is lighter	630	552 (67.40)	78 (38.80)	144.335	<0.001
Sputum is worse than usual	282	160 (19.54)	122 (60.70)		
Respiratory					
No shortness of breath	72	68 (8.30)	4 (1.99)		
Light shortness of breath	566	500 (61.05)	66 (32.84)	83.637	<0.001
Shortness of breath is more severe than usual	382	251 (30.65)	131 (65.17)		
CAT					
Slight symptoms	38	36 (4.40)	2 (0.99)		
Medium	348	321 (39.19)	27 (13.43)	-6.421[2)]	<0.001
Serious	528	390 (47.62)	138 (68.66)		
Very serious	106	72 (8.79)	34 (16.92)		
ADL					
Completely independent	148	144 (17.58)	4 (1.99)		
Mild dysfunction	612	523 (63.86)	89 (44.28)		
Moderate dysfunction	169	107 (13.06)	62 (30.84)	122.864	<0.001
Severe dysfunction or complete dependence	91	45 (5.50)	46 (22.89)		

GDS					
There is no depression	433	390 (47.62)	43 (21.39)		
Mild depression	464	361 (44.08)	103 (51.24)	76.593[1)]	<0.001
Moderate to severe depression	123	68 (8.30)	55 (27.37)		
Nutritional condition					
Normal nutritional status	282	256 (31.26)	26 (12.94)		
Risk of malnutrition	486	416 (50.79)	70 (34.83)	105.043[1)]	<0.001
Malnutrition	252	147 (17.95)	105 (52.23)		
Frail condition					
No weak	122	115 (14.04)	7 (3.48)		
Suspicious weak	364	303 (37.00)	61 (30.35)	-4.175[2)]	<0.001
Weak	534	401 (48.96)	133 (66.17)		

TABLE 2: MATRIX AFTER ROTATION OF FACTOR LOAD

Characteristics	Common factor 1	Common factor 2	Common factor 3	Common factor 4	Common factor 5	Common factor 6
Frail condition	0.720	0.106	0.038	-0.025	0.040	0.037
GDS	0.713	0.021	0.002	0.061	-0.003	-0.092
CAT	0.627	0.321	0.105	-0.065	-0.033	0.007
Nutritional condition	0.621	-0.011	0.040	0.114	0.036	0.208
ADL	0.614	0.201	0.041	0.124	-0.087	0.278
Sputum situation	0.048	0.833	-0.003	0.047	0.050	0.104
Cough situation	0.105	0.798	0.020	-0.010	-0.087	0.000
Respiratory condition	0.309	0.689	0.094	-0.069	0.089	0.013
Diabetes	0.029	0.073	0.809	-0.014	-0.052	0.075
CHD	0.062	-0.077	0.779	0.005	0.006	0.028
Hypertension	0.058	0.096	0.705	-0.040	0.022	0.029
Eating position	0.010	0.039	-0.027	0.873	-0.021	0.056
Can attention to eating	0.135	-0.061	0.002	0.853	0.017	-0.002
Smoking history	0.058	0.033	-0.034	0.034	0.861	0.065
Sex	-0.060	-0.008	0.015	-0.038	0.860	-0.020
Teeth missing	0.018	0.013	0.045	0.039	0.086	0.820
Age	0.209	0.082	0.083	0.006	-0.042	0.777

and eating status were included in exploratory factor analysis. The results showed that KMO=0.726>0.6, and approximate 2=2318.763 (df=136, p<0.001) in Bartlett spherical test, which met the factor analysis conditions. According to Eigenvalues>1 as the standard and combining with the gravel diagram, the number of common factors extracted is 6. The total variation of interpreted data is 80.1 % (Table 2) for the factor load matrix. According to the variable content corresponding to the common factor, the common factor 1 was defined as the comprehensive condition of the elderly, the common factor 2 as the disease condition, the common factor 3 as the eating condition, the common factor 4 as the smoking condition, the common factor 5 as the comorbidities and the common factor 6 as the age factor.

On the basis of exploratory factor analysis, combined with literature and professional knowledge, building has six latent variables (Comprehensive condition of aging, disease conditions, feeding conditions, smoking status, comorbidities and age factor) and 17 show variables (measurement) of structural equation model, the initial structural equation model of the standardized path diagram (fig. 1).

The fitness of the model was tested according to the initial model path diagram, and it was found that the model could be recognized, but the fitting index was not ideal enough to meet the fitness standard (Table 3). Add the path according to the larger correction index and the actual situation (correction index is greater than 7.882 before correction), and delete the path without statistical significance. Through repeated modification and fitting of the model, a model with good fitting index was finally established (fig. 2).

The comprehensive condition of the elderly directly affects dysphagia, the effect value was 0.372. The disease condition not only directly affects dysphagia, but also affects it through the pathway: Disease

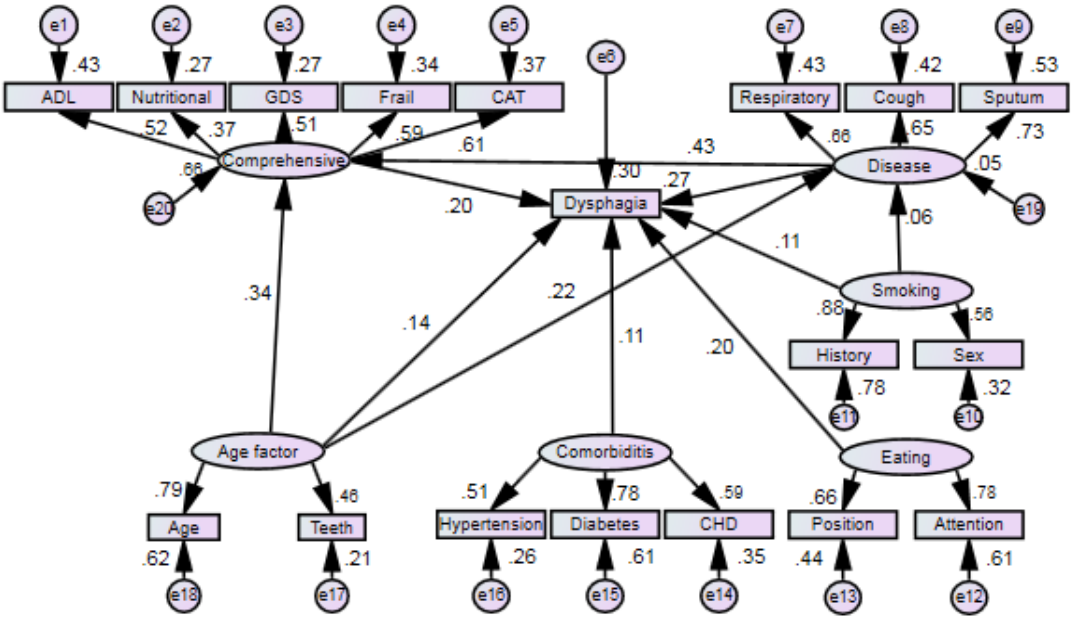

Fig. 1: Structural equation Model of influencing factors of dysphagia in elderly COPD patients (Initial)

TABLE 3: FITTING INDEX OF INFLUENCING FACTORS OF DYSPHAGIA IN ELDERLY COPD PATIENTS

Project	x^2/df	RMSEA	NFI	RFI	TLI	CFI	PRATIO	PNFI	PCFI
Reference	1~2	<0.08	>0.9	>0.9	>0.9	>0.9	>0.5	>0.5	>0.5
Initial model	2.548	0.047	0.872	0.844	0.899	0.917	0.824	0.718	0.755
Final model	1.610	0.029	0.923	0.901	0.960	0.969	0.784	0.724	0.760

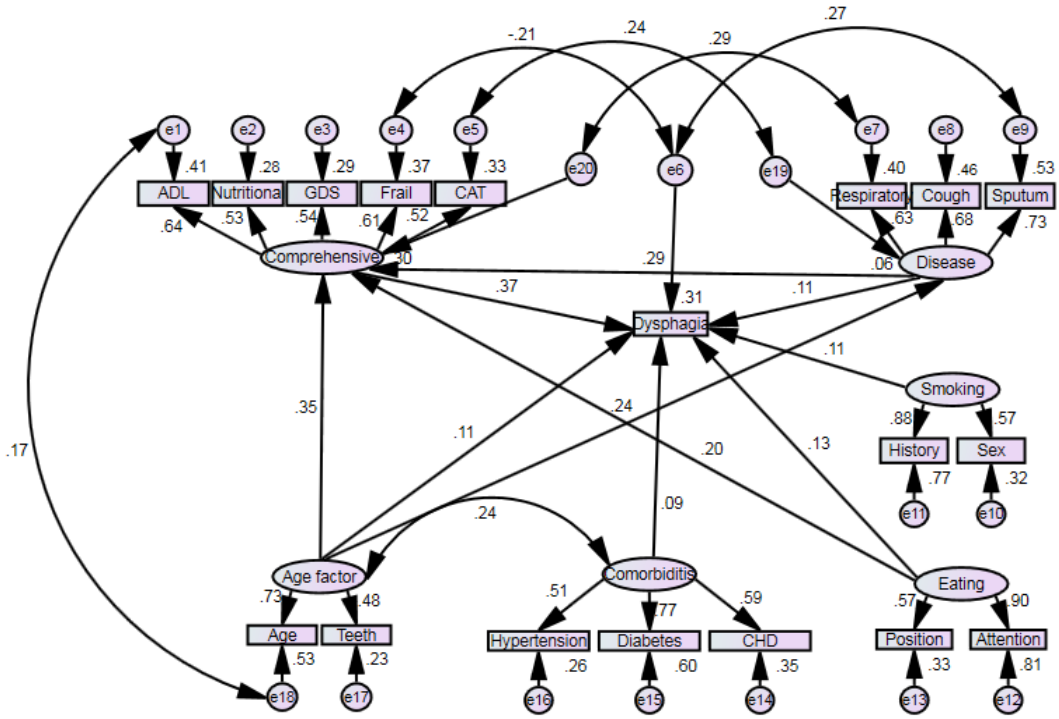

Fig. 2: Structural equation model of influencing factors of Dysphagia in elderly COPD patients (Modified)

condition-The comprehensive condition of the elderly (direct effect 0.109, indirect effect 0.109 and total effect 0.218). Smoking condition directly affects dysphagia, the effect value was 0.112. Age factors not only directly affects dysphagia, but also affects it through two pathways: Age factors-Disease condition and Age factors-The comprehensive condition of the elderly (direct effect 0.113, indirect effect 0.183 and total

effect 0.296). Eating condition not only directly affects dysphagia, but also affects it through the pathway: Eating condition-The comprehensive condition of the elderly (direct effect 0.127, indirect effect 0.074, total effect 0.201). Comorbidities directly affects dysphagia, the effect value was 0.095 (fig. 2 and Table 4).

Stein *et al.*[33] evaluated the swallowing function of COPD patients and found that 68.18 % of COPD patients had dysphagia. Coelho *et al.*[34] found that 21 % of COPD patients had swallowing dysfunction. Gonzalez *et al.*[10] showed that 65 % of the patients had supervisor symptoms and signs of dysphagia, and 49 % showed objective signs of dysphagia. The results of this study showed that the incidence of dysphagia in elderly COPD patients was 19.71 %, meaning that 1 in 5 patients had dysphagia, which is a noteworthy situation. This survey is quite different from other scholars' research reports, which may be related to different screening methods, Gonzalez *et al.*[10] evaluated and tested the swallowing function of COPD patients through questionnaire survey and the combination of solid test and water test. Coelho *et al.*[34] used X-ray fluoroscopy to examine the swallowing function of patients. On the other hand, it may be related to the different degree of disease of the included subjects. The severity of the disease in COPD patients would affect their swallowing function. Dysphagia is a common problem in patients with COPD and should be of concern.

The results of this study show that comprehensive conditions of the elderly directly affects the dysphagia, the effect value was 0.372, That is, the worse the comprehensive condition of the elderly, the greater the likelihood of dysphagia. As a result of chronic degenerative disease, elderly patients generally have poor nutritional status, mental status and activity ability, and are the high incidence of chronic diseases. Based on exploratory factor analysis, Nutritional condition, ADL score, GDS score, Frail condition and CAT score were used as indicators to reflect the comprehensive condition of the elderly. Garand *et al.*[35] showed that the incidence of dysphagia in COPD patients with malnutrition was relatively high, which was similar to the results of this study, which may be related to the poor nutritional status leading to the weakness of the tongue, hypoesthesia of the upper digestive tract, and weakness of the swallowing muscles, thus causing the impaired swallowing function. In patients with Frail, the glossal muscle strength is weakened and hyoid motor is slowed down, often lead to decreased swallowing efficiency and food residues[36]. Cohen *et al.*[37] showed that the incidence of dysphagia in Non-frail, Pre-frail and Frail inpatients respectively was 2.9 %, 7.9 % and 16.0 % ($p<0.001$), which were similar to the results of this study. Few previous studies have analyzed the Activities of Daily Living as an influencing factor of dysphagia. In this study, it was found that patients with poor ability of daily living were more likely to have swallowing disorder, which may be related to the weak muscle strength of patients with poor self-care ability, affecting the swallowing related muscles. According to the study, the incidence of depression is significantly higher in COPD patients than in non-COPD patients. Swallowing is a complex neural reflex process that is not only dominated by brain consciousness but also by emotional activity, and patients with depression tend to have poor swallowing function[38]. In this study, CAT score was considered as a factor affecting swallowing disorder, and the higher the CAT score, the higher the risk of dysphagia.

Dysphagia is not only directly affected by the disease condition, but also indirectly affected by the comprehensive conditions of the elderly. In this study, respiratory, cough and sputum were used as indicators to reflect the disease conditions of patients. In this study, respiratory, cough and sputum were used as indicators to reflect the disease status of patients. Patients with acute exacerbation of COPD showed aggravation of cough, sputum and shortness of breath. On the one hand, progressive hyperinflation of lung and increase of lung volume would occur. On the other hand, the patient's dyspnea worsened, the level of respiratory center drive increased, and the negative chest pressure increased. Therefore, patients with acute

TABLE 4: ANALYSIS OF THE INFLUENCE PATH OF EACH FACTOR IN DYSPHAGIA

Variable	Dysphagia		
	Direct effect	Indirect effect	Total effect
Comprehensive condition of the elderly	0.372	-	0.372
Disease condition	0.109	0.109	0.218
Smoking condition	0.112	-	0.112
Age factors	0.113	0.183	0.296
Eating condition	0.127	0.074	0.201
Comorbidities	0.095	-	0.095

exacerbation often suffer from swallowing dysfunction due to enlarged lung volume and increased pressure difference between oropharynx and thorax[8]. COPD not only causes physical harm to patients, but also affects their mental health. However, there has been no study to investigate whether the disease condition affects swallowing function in elderly patients through their comprehensive conditions. The results of this study suggested that the disease condition has an indirect effect on dysphagia through comprehensive conditions of the elderiy, with an effect value of 0.109.

Smoking condition had a direct effect on dysphagia, the effect value was 0.112. Smoking history and gender were used as indicators to reflect smoking condition of patients in this study. On the one hand, smoking is significantly associated with acute exacerbation, which aggravates the inflammatory response status of COPD patients. On the other hand smoking patients with laryngeal sensitivity decreased[13,39]. Yoshimatsu *et al.*[16] showed that smoking history was an influential factor in dysphagia. Some research results showed that there were statistically significant differences in the occurrence of dysphagia among patients of different genders, which was consistent with the results of this study. However, Gonzalez *et al.*[10] indicated that gender had no significant influence on the occurrence of dysphagia. This may be due to the fact that most of the male patients in this study are smokers and have ever smoked, 24 % of the male patients in the study had never smoked, while 85 % of the female patients had never smoked.

Age factors not only directly affects dysphagia, but also indirectly affect them through two pathways of comprehensive conditions of the elderly and disease condition. This study used age and the number of teeth lost as indicators of age factors.

Because of some pathophysiological changes associated with aging, Most of the elderly taste bud atrophy, gland secretion function decline, nerve peripheral receptor function gradually dull, muscle degeneration, pharynx and esophageal peristalsis ability weakened can lead to decreased appetite, active desire to swallow and swallow function decline, these age-related changes make the elderly become the high incidence of dysphagia[1,2]. The elderly often suffer from tooth loss due to calcium loss, which will lead to decreased chewing function. Okamoto *et al.*[15] indicated that the number of tooth loss is positively correlated with the swallowing function. The growth of the age can cause low immunity, cough reflex in patients with weak, sickly coexist and malnutrition, So the age is a risk factor for infection in patients, the bacteria and virus infection is considered to be the COPD patients with acute exacerbation of the most common cause, at the same time as the growth of the age old people each functional degradation, The comprehensive conditions of the elderly is generally poor[40,41]. At present, there is lack of relevant study on the influence of age factors on dysphagia through comprehensive conditions of the elderly and disease conditions. The results of this survey show that age factors can indirectly affect dysphagia through comprehensive conditions of the elderly and disease conditions, with an effect value of 0.183.

The results of this study show that eating condition not only directly affects the occurrence of dysphagia, but also indirectly affects it through the comprehensive conditions of the elderly. This study takes eating position and Can attention to eating as indicators to reflect eating status. The influence of eating position on the occurrence of dysphagia is controversial. Some scholars have showed that in addition to food, oral secretions can also enter the airway and cause dysphagia. Simply change the eating position cannot reduce the occurrence of dysphagia[42]. Few studies have reported the effect of intentional to eating on the occurrence of dysphagia. Patients with poor eating conditions often have poor nutritional status leading to poor overall functional status. At present, there is lack of relevant study on the influence of eating conditions on dysphagia through comprehensive conditions of the elderly. The results of this survey show that the indirect effect of eating status on the occurrence of dysphagia through comprehensive conditions of the elderly is 0.074.

The results of this study show that comorbidities have a direct effect on dysphagia with an effect value of 0.095. Hypertension, diabetes and coronary heart disease were used as indicators of comorbidities in this study. Bassi *et al.*[3] showed that the most common comorbidities associated with symptoms and signs of dysphagia include hypertension, diabetes, coronary heart disease, etc. As a special group of elderly people, most of them are associated with basic comorbidities, which make them more vulnerable. Therefore, comorbidities may cause swallowing disorders.

In this study, the incidence of dysphagia in elderly COPD patients was 19.71 %. The occurrence of dysphagia was directly affected by the comprehensive condition of the elderly, smoking condition and comorbidities. The disease condition, age factors and

eating condition; not only directly affects the occurrence of dysphagia, but also have indirect effects on it through other factors. Therefore, health care professionals should not only focus on the direct factors affecting swallowing disorders in COPD patients, but also on the nutritional status, mood changes, and mobility of patients with severe conditions, and take measures to prevent malnutrition, depression, and low mobility in daily life. Older patients should not only focus on their Comprehensive condition, but also take measures to prevent exacerbations in COPD patients. Inability to sit up and focus on food should help patients eat effectively to avoid affecting their Comprehensive condition.

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There is no conflict of interest in this study.

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