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Original Article

Factors affecting depression in elderly patients with coronary heart disease and the effect of comprehensive nursing intervention

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Abstract: Objective: To analyze the risk factors of depression in elderly patients with coronary heart disease (CHD), and to explore the effect of comprehensive nursing care on improvements in depression and quality of life in such patients. Methods: In Phase I of this study, 192 patients admitted to the hospital from May to December, 2016 were selected as subjects, a case-control study was conducted to analyze the risk factors for depression in elderly patients with CHD. In Phase II of this study, 144 patients admitted to the hospital from January to June 2017 were randomized to either comprehensive nursing intervention (primarily cognitive behavioral psychological intervention and continuous nursing) or routine nursing. The effects of comprehensive nursing intervention on depression and quality of life were assessed in the patients. Results: In this study, the prevalence of depression in elderly patients with CHD was 49.0%. Univariate analysis revealed that age, women, education and income levels, course of disease and pain may be associated with depression in elderly patients with CHD. Multivariate logistic regression analysis showed that gender, longer course of disease, lower family income and insomnia were independent risk factors for depression in elderly patients with CHD. The adjusted odds ratios (OR) were 1.87 (95% CI: 1.19 to 2.30), 1.09 (95% CI: 1.04 to 1.1.14), 1.51 (95% CI: 1.17 to 1.86) and 1.94 (95% CI: 1.61 to 2.27), respectively. The improvements in the SDS scores and SF-36 quality of life scores in the comprehensive nursing intervention group were significantly greater than those in the routine nursing group. Conclusion: Women, longer course of disease, low family income and insomnia are independent risk factors for depression in elderly patients with CHD. Comprehensive nursing care results in greater improvements in depression and quality of life of the patients than routine nursing care.

Keywords: Coronary heart disease, depression, quality of life, nursing intervention

Introduction

With the development of social economy and changes of lifestyle, the trend of aging has become more and more obvious in China in recent years. The latest data reveal that the population aged 60 and above in China had reached 241 million by the end of 2017, with an annual growth rate of aging of approximately 5% [1]. The acceleration of aging in the population has also resulted in the increasingly higher mortality rate of chronic noninfectious diseases such as cardiovascular and cerebrovascular diseases in China. Studies have shown that during the period from 2006 to 2013, 51.2% of coronary heart disease (CHD) cases in China could be attributed to an aging population [2]. The mortality rate of CHD increases significantly after being 55 years old in both female and male patients [3]. While getting older, elderly patients are prone to negative emotions such as depression with the decline of physical functions; elderly patients with CHD are at higher risk of depression [4, 5]. For elderly patients with CHD, depression may have adverse effects on their treatment compliance, quality of life (QoL) and even prognosis [6, 7]. Previous studies have suggested that being female, body mass, hypertension, diabetes, family income, and sleep problems may increase the risk of depression in patients with CHD, but the findings of the studies are not consistent [8-10]. The research on the risk factors of depression in elderly patients with CHD is helpful to provide evidence for planning intervention measures to alleviate depression in such patients.

Given the high risk of depression among elderly patients with CHD, in addition to medical treatment, it is necessary to adopt a variety of nursing methods to promote the rehabilitation and management of the patients. Comprehensive nursing intervention is an intervention that uses psychological nursing and other nursing methods to manage and intervene with patients while making a comprehensive consideration of physical, mental and other aspects of the patients. Comprehensive nursing interventions are increasingly widely used in clinic practices [11]. Studies have proven that they help to improve patients' negative emotions and QoL [12, 13]. Some studies also show that a variety of nursing methods, including psychological intervention, can effectively alleviate depression and anxiety of patients with CHD, and improve their QoL, but the findings are not entirely consistent [14-16]. Therefore, this study was designed to analyze the risk factors of depression in elderly patients with CHD, and to assess the effects of comprehensive nursing intervention on depression and QoL in such patients, so as to validate the effects of the intervention, providing scientific evidence for the beneficial effects of comprehensive nursing care in elderly patients with CHD.

Materials and methods

Subjects

The subjects in this study were 336 patients with stable CHD admitted to our hospital from May 2016 to June 2017. Inclusion criteria were: Patients who met the diagnostic criteria for chronic stable CHD as diagnosed by coronary angiography or CT; cardiac function I-III; 60 years old or above, and patients who provided informed consent and participated in the study voluntarily. Exclusion criteria were: Patients who had Alzheimer disease or consciousness disorders and were unable to communicate effectively with the medical staff; patients with severe arrhythmia or cardiogenic shock; acute coronary syndrome or myocardial infarction; patients who had severe organ dysfunction (such as disease in liver, kidney or other major organs) or malignant tumors; and were taking antipsychotic drugs.

Study design

This study consists of two phases. Phase I, was designed to explore the risk factors of depression in elderly patients with CHD. The subjects were 192 patients admitted to the hospital from May to December 2016. Individual information and related clinical data after admission were collected from all the patients. They were assigned to the case group or the control group according to whether they had depression (as for adjustment criteria, see Section 1.3 Outcome measures). The risk factors of depression in the patients were analyzed based on a case-control study.

In Phase II, we assessed the effects of comprehensive nursing interventions on depression and QoL in elderly patients with CHD. The subjects in Phase II were 144 patients admitted to the hospital from January to June 2017. The patients were randomly subdivided into the comprehensive nursing group and the routine nursing group by a computer program with random number generation. After admission, the patients in the routine nursing group received conservative drug therapy or intervention therapy based on the results of coronary angiography. During hospitalization, they received routine treatment and nursing care (including medication and nutritional guidance, precautions on intervention operation and postoperative anticoagulation therapy) in the Cardiology Department. They continued drug therapy after discharge. The comprehensive nursing group received the following nursing care besides routine nursing: (1) Depression risk assessment: after admission, based on the results of the previous case-control study, literature and reports, the patients were given mental status assessment to confirm who were at high risk of depression; (2) Health education: during hospitalization, the physicians and nurses from the department regularly carried out lectures on CAD-related health education once or twice a week. The contents of education included the knowledge related to the treatment of CHD and the techniques concerning mental status adjustment etc. (3) Cognitive behavior intervention [17]: The medical staff communicated with the patients to know their psychological pressure and major problems, and help the patients understand their own unreasonable beliefs and negative emotions as well as abnormal performance arising from these problems. They also questioned the patients' unreasonable beliefs, and debated with them on unreasonable beliefs by means of continuous questioning, so as to change their unreasonable

beliefs. As a result, with their help, the patients could learn and gradually develop the methods of changing unreasonable beliefs, identify and correct unhealthy interpretation, so as to realize the goal of replacing their reasonable beliefs. They were instructed to carry out progressive relaxation training, take slow and deep breaths according to the investigators' instructions, relax the muscles of the whole body, and try their best to eliminate their psychological anxiety, depression and tension. (4) Continuous nursing care: After discharge, the patients continued to receive nursing interventions by telephone, Wechat or other Internet communication media, as well as nursing and rehabilitation guidance (including self-management, nutritional guidance and relaxation training). In addition, in the above-mentioned comprehensive nursing process, the strategy linking work at selected spots with that in the entire area was adopted, and close attention was given to the individuals at high risk while the whole group of patients was also taken into account. In this study, all the psychological intervention providers had participated in relevant training on psychological intervention. The nursing care program lasted for 3 months.

Outcome measures

Depression: The depression of patients was assessed using the Zung's Depression Scale (SDS) at admission and 3 months of follow-up after discharge [18]. The scale includes 20 items, and each item is scored by a 1-4 grade, with a total of 80 points. The results were rated by standard scores. The calculation formula is as follows: Standard score = (Total score/80)* 100. Higher standard scores indicate more severe depression. SDS scores less than 50 indicated non-depression, SDS scores ranging from 50 to 69 indicated mild depression, SDS scores ranging from 60 to 69 indicated moderate depression, and SDS score of 70 or more indicated severe depression.

Quality of life: The QoL of patients was evaluated with the use of the SF-36 health scale at admission and at post-discharge month 3 [19]. The scale includes 36 items. QoL is evaluated from eight dimensions, including physical functioning, physical role functioning, bodily pain, general health, vitality, social role functioning, emotional role functioning and mental health. Higher scores indicate better QoL. There were 100 points for each item, with higher scores indicating better quality of life.

The patients filled in the above scales after the nurses who had received special training had explained to them the contents and requirements of the scales in detail. After filling in the forms, the nurses checked one by one to ensure the reliability and authenticity of the information.

Statistical analysis

Measurement data are expressed as mean ± standard deviation. The means between the two groups were compared by an independent t-test with two samples. Categorical variables are described as constituent ratio, and their differences were compared by a two-sided Chi-square test. Multivariate logistic regression was used to analyze the risk factors of depression in elderly patients with CHD. In multivariate analysis, a likelihood ratio test was performed based on maximum local likelihood, and independent variables were selected step by step. In the assessment of depression and QoL intervention, a paired t-test was utilized to compare the two groups in the changes in depression and QoL scores before and after intervention; independent t-tests with two samples was used to compare the differences in depression and QoL scores between the two groups. The significance level was set as two-sided alpha equal to 0.05. The data were analyzed by the SPSS software, version 20.0.

Results

Basic data

Among the 192 patients admitted to the hospital between May and December 2016, 94 had depression according to their depression scores, and the prevalence of depression was 49.0% (**Table 1**). Among the patients with depression, mild depression and moderate depression were reported in 65 cases (69.1%) and 29 cases (30.9%), respectively.

Differences in individual and clinical characteristics among elderly patients with CHD

Table 1 also shows the individual and clinical characteristics of 94 depressive patients (case group) and 98 non-depressive patients (control group). The rate of women in the case group

Table 1. Univariate analysis of measurement data in the case group and the control group (n, %)

Characteristics	Control group (n = 98)	Case group (n = 94)	χ^2/t	P
Age			0.752	0.687
60-69	39 (39.80)	43 (45.74)		
70-79	44 (44.90)	37 (39.36)		
80-	15 (15.31)	14 (14.89)		
Sex			10.977	0.001
Male	62 (63.27)	37 (39.36)		
Female	36 (36.73)	57 (60.64)		
Education level			4.662	0.031
High school and below	68 (69.39)	51 (54.26)		
College and above	30 (30.61)	43 (45.74)		
Monthly household income			4.028	0.045
<6000	39 (39.80)	51 (54.26)		
≥6000	59 (60.20)	43 (45.74)		
Marital status			1.484	0.223
Unmarried/widowed/divorced	9 (9.18)	14 (14.89)		
Married	89 (90.82)	80 (85.11)		
Treatment method			2.561	0.110
Drug therapy	73 (74.49)	60 (63.83)		
Intervention therapy	25 (25.51)	34 (36.17)		
Course of disease (year)	8.7±5.6	12.1±9.2	3.107	0.002
Sleep			4.642	0.031
No insomnia	67 (68.37)	50 (53.19)		
Insomnia	31 (31.63)	44 (46.81)		
Hypertension			4.531	0.033
No	38 (38.78)	23 (24.47)		
Yes	60 (61.22)	71 (75.53)		

Table 2. Multivariate analysis of depression in elderly patients with CHD

Characteristics	Adjusted OR*	95% CI	P
Sex			0.031
Male	Reference	Reference	
Female	1.87	1.19-2.30	
Course of disease	1.09	1.04-1.14	0.035
Monthly household income			0.042
<6000	Reference	Reference	
≥6000	1.51	1.17-1.86	
Sleep			0.029
No insomnia	Reference	Reference	
Insomnia	1.94	1.61-2.27	

Note: *Adjusted education levels and hypertension.

was 60.64%, which was significantly higher than 36.73% in the control group (P = 0.001). The rate of patients with college education and above in the case group was 45.74%, which was significantly higher than that in the control group (P = 0.031). The income level in the case group was lower than that the control group, the course of disease was longer, and the rates of sleep problems and hypertension were higher (all P<0.05). In addition, there were no significant differences in age, marital status and treatment methods between the two groups (all P>0.05).

Independent risk factors for depression in elderly patients with CHD

Table 1 also shows that women, education and income levels, course of disease, sleep and hypertension may be associated with depression in elderly patients with CHD. After including the above factors in the logistic regression analysis, we found that being a woman, longer course of disease, lower family income and insomnia were independent risk factors for depression in elderly patients with CHD. The adjusted odds ratios (OR) were 1.87 (95% CI: 1.19 to 2.30), 1.09 (95% CI: 1.04 to 1.1.14), 1.51 (95% CI: 1.17 to 1.86) and 1.94 (95% CI: 1.61 to 2.27), respectively (**Table 2**).

Significantly greater improvements with comprehensive nursing than with routine nursing

One hundred and forty-four patients admitted to the hospital from January to June 2017 were subdivided into two groups (*the routine nursing*

Table 3. Comparison of patients' general characteristics between the comprehensive nursing group and the routine nursing group (n, %)

Characteristics	Comprehensive nursing group (n = 72)	Routine nursing group (n = 72)	χ	P
Age			1.848	0.397
60-69	26 (36.11)	21 (29.17)		
70-79	39 (54.17.29)	39 (54.17)		
80-	7 (9.72)	12 (16.67)		
Education level			1.597	0.206
High school and below	47 (65.28)	39 (54.93)		
College and above	25 (34.72)	32 (45.07)		
Monthly household income			1.007	0.316
<6000	30 (41.67)	36 (50.00)		
≥6000	42 (58.33)	36 (50.00)		
Course of disease (year)	9.8±5.9	11.1±9.7	0.972	0.333
Sleep			1.052	0.305
No insomnia	41 (56.94)	47 (65.28)		
Insomnia	31 (43.06)	25 (34.72)		

Table 4. Comparison of improvements in depression between the comprehensive nursing group and the routine nursing group

Item	Intervention	Comprehensive nursing group (n = 72)	Routine nursing group (n = 72)	t	P
SDS	BI	61.37±24.56	63.95±31.38	0.549	0.584
	AI	50.48±26.31	59.92±25.65	2.180	0.031
	Difference	10.89±20.31	4.03±10.69	2.536	0.012
	t	4.550	3.199		
	P	<0.001	0.002		

Note: SDS denotes self-rating depression scale; BI, before intervention; AI, after intervention.

group or the comprehensive nursing group) in terms of the nursing methods. There were no significant differences in age, education level, family income and course of disease between the two groups (all P>0.05, **Table 3**).

Before intervention, the depression scores of the comprehensive nursing group and the routine nursing group were 61.37±24.56 and 63.95±31.38, respectively, with no significant difference. At the end of the intervention, the depression score of the comprehensive nursing group was significantly lower than that of the routine nursing group (P = 0.31). The depression scores of both groups decreased significantly (P<0.01), but the improvement of depression in the comprehensive nursing group was significantly greater than that in the routine nursing group (P = 0.012, **Table 4**).

Table 5 shows the changes in QoL of the two groups before and after intervention. There was no significant difference between the two groups in the scores before intervention (all P>0.05). The scores of all dimensions of QoL in both groups during the study period were improved more significantly than those at admission (all P> 0.05). However, at the end of the intervention, the improvements in physical functioning, general health, vitality, social role functioning, emotional role functioning and mental health in the comprehensive nursing group were significantly greater than those in the routine nursing group (all P<0.05). Accordingly, the scores of the above-mentioned dimensions in the comprehensive nursing group were also significantly higher than those in the routine nursing group (all P<0.05).

Discussion

Depression has become a common psychological problem among elderly people due to their older age, declined physical functions and changes in their working conditions. A meta-analysis indicated that the rate of depression among elderly people was 22.6% in China [20]. Among the elderly with CHD, the rate of depression is higher. The meta-analysis showed that the rate of depression detected in elderly patients with CHD is as high as 48.1% in China [21]. In this study, the prevalence of depression in elderly patients with CHD was 49.0%, which was consistent with the above findings.

In this study, being a woman, longer course of disease, lower family income and insomnia

Table 5. Comparison of improvements in QoL between the comprehensive nursing group and the routine nursing group

QoL	Intervention	Comprehensive nursing group (n = 72)	Routine nursing group (n = 72)	t	P
PF	BI	59.33±30.62	60.19±33.95	0.160	0.873
	AI	69.81±20.76	63.06±18.77	2.046	0.043
	Difference	10.48±22.65	2.87±10.25	2.597	0.010
	P	<0.001	0.020		
PRF	BI	29.26±17.75	31.23±22.56	0.582	0.561
	AI	37.23±19.42	31.17±19.26	1.880	0.062
	Difference	7.97±16.36	3.94±9.04	1.829	0.069
	P	<0.001	<0.001		
BP	BI	43.52±20.75	47.65±22.41	1.147	0.253
	AI	50.64±21.37	50.52±21.63	0.106	0.916
	Difference	7.12±19.28	2.87±6.93	1.760	0.081
	P	<0.001	<0.001		
GH	BI	52.25±24.23	49.82±26.69	0.572	0.568
	AI	62.27±28.16	52.96±21.86	2.216	0.028
	Difference	10.02±24.15	3.14±10.06	2.231	0.027
	P	<0.001	0.010		
Vitality	BI	40.61±24.16	39.82±25.19	0.192	0.848
	AI	50.43±21.61	43.33±19.62	2.064	0.041
	Difference	9.82±19.26	3.51±9.35	2.501	0.014
	P	<0.001	0.002		
SRF	BI	53.16±24.31	50.72±26.88	0.571	0.569
	AI	62.84±27.01	54.03±25.92	1.997	0.048
	Difference	9.68±24.29	3.31±9.63	2.036	0.044
	P	<0.001	0.005		
ERF	BI	57.57±29.15	54.21±28.83	0.695	0.488
	AI	67.82±35.67	57.95±21.69	2.006	0.048
	Difference	10.25±25.74	3.74±8.01	2.049	0.042
	P	<0.001	<0.001		
MH	BI	44.46±23.78	41.65±30.39	0.618	0.538
	AI	55.28±30.29	45.62±27.83	1.993	0.048
	Difference	11.82±29.64	3.97±10.74	2.113	0.036
	P	0.001	0.002		

Note: QoL denotes quality of life; BI, before intervention; AI, after intervention; PF, physical functioning; PRF, physical role functioning; BP, bodily pain; GH, general health; SRF, social role functioning; ERF, emotional role functioning; MH, mental health.

were independent risk factors for depression in elderly patients with CHD, and the findings were similar to, but not completely consistent with those in other studies [9, 22, 23]. Some studies suggest that older patients with CHD are more likely to suffer from depression, while others report that younger patients are more likely to suffer from depression [22, 24]. However, we have not found that age was associated with depression in this study, which was similar to the results of other studies [9]. Some studies have also shown that low education levels or chronic diseases such as hypertension are associated with depression, but no significant correlation was found between them in this study [9]. The discrepancies between the above results may be related to the relatively simple age structure among the subjects in this study as the patients included are all elderly ones. A meta-analysis indicated that there was a moderate correlation between sleep quality and the risk of depression and anxiety in the elderly, which was similar to the results of this study [26]. Additionally, it is reported that smoking, family history of CHD, rapid heart rate, family history of depression and other factors are associated with depression in elderly patients with CHD, but the results of previous studies are not consistent [9, 27, 28]. Therefore, the association between the above factors and depression in elderly patients with CHD needs further exploration.

Depression is not only a risk factor for CHD, but also affects prognosis and QoL of patients with CHD [25]. Therefore, for elderly patients with CHD, in addition to drug therapy, nursing intervention also plays an important role in the stability and rehabilitation of the patients' conditions. In recent years, comprehensive nursing interventions including psychological intervention, health education and continuing nursing have been widely used in clinical practice, and have been reported to be used in the nursing care of CHD [14, 29, 30]. A meta-analysis indicated that psychological

intervention can moderately improve depressive symptoms and social support in patients with CHD, but the number of studies included in this analysis is limited, and the heterogeneity of the studies is great [30]. Another meta-analysis found that psychological nursing intervention did not significantly improve the negative emotions of patients with heart failure. In this study, comprehensive nursing intervention based on cognitive behavioral psychological nursing and continuing nursing resulted in more significant improvements in the depression and QoL scores of the comprehensive nursing group than those of the routine nursing group, which were similar to the findings of other studies in China [31, 32]. However, the results of comprehensive nursing interventions on negative emotions and quality of life of patients with CHD are not exactly the same. In another meta-analysis, it was found that psychological intervention did not significantly improve the negative emotions of patients with heart failure [14]. Generally speaking, the effect of comprehensive nursing intervention primarily based on psychological intervention on QoL of elderly patients with CHD needs further evaluation because of the differences in intervention methods, patient characteristics, evaluation indicators, the process of randomization and analysis methods.

This study has some advantages. For example, we first used a case-control study to explore the risk factors of depression in elderly patients with CHD, and then identified high-risk individuals, so that targeted intervention could be carried out. We also adopted randomization, so that the individual and clinical characteristics of patients were basically consistent between the comprehensive nursing group and the routine nursing group. However, this study also has some limitations. For example, it is difficult to eliminate the impacts of bias completely due to the retrospective nature of a case-control study. In the process of intervention assessment, blinding was not taken, and the intervention time was short. As a result, it is difficult to observe the long-term impacts of comprehensive nursing intervention on QoL and prognosis of patients.

In conclusion, this study was aimed to explore the risk factors of depression in elderly patients with CHD, and comprehensive nursing intervention was carried out in such patients. The results show that comprehensive nursing care resulted in greater improvements in depression and QoL among patients than conventional nursing care. In the future, by taking long-term intervention and follow-up, randomized controlled studies with larger sample sizes are required to evaluate the effect of comprehensive nursing intervention on adverse emotions and QoL of elderly patients with CHD by means of unified evaluation and treatment.

Disclosure of conflict of interest

None.

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