Research Article

Mental Health and Its Risk Factors in Community Elderly with Chronic Non-Communicable Diseases

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Abstract

Background: Understanding the mental health status of the elderly with chronic non-communicable diseases (CNCDs) in community and analyzing its related factors are essential for improving the quality of life of the elderly.

Methods: A cross-sectional study was designed, and a face-to-face questionnaire survey was conducted to collect basic information, personal health status and lifestyle. Mental health status was assessed using the Depression Anxiety Stress Scale-21 (DASS-21). A multivariate logistic regression was used to evaluate the factors associated with mental health.

Results: The abnormal rate of general mental health status in the elderly with CNCDs was 26.16%. Specifically, the prevalence of depression, anxiety, and stress symptoms was 11.39%, 19.83%, and 7.59%, respectively. Sleep disorder was an independent risk factor for depression, anxiety, stress and general abnormal mental health status (odds ratios (ORs): 2.99, 4.61, 10.78 and 4.14, respectively). Sedentary time was independently associated with general abnormal mental health status with an OR 2.33 for sedentary time>4 hours per day. Drinking was independently associated with depression (OR: 5.51). Women elderly had higher risk for general abnormal mental health status with an OR of 3.23.

Conclusions: Drinking, sedentary lifestyle, sleep disorders and female were potential independent risk factor for abnormal mental health in the elderly with CNCDs. Our findings may lay the foundation for future interventions.

Keywords: Elderly; Mental health; Depression; Anxiety; Stress; Risk factor

Abbreviations

CNCDs: Chronic Non-Communicable Diseases; DASS-21: Depression Anxiety Stress Scale-21; IPAQ: International Physical Activity Questionnaire; MET: Metabolic Equivalent; PSQI: Pittsburgh Sleep Quality Index; IQR: Interquartile Ranges; OR: Odds Ratio; CI: Confidence Intervals

Introduction

The aging population is growing in China. In 2019, there were 164.5 million Chinese citizens aged 65 and over [1]. The number is expected to be about 400 million in 2050 [2]. WHO argues an "active ageing" strategy to enhance the health, participation and security of older citizens [3]. Active ageing refers to that the elderly are in a good state of physical, psychological and social adaptation in order to enhance quality of life as people age [4]. Research on the mental health of the elderly showed that the poor mental health status affects their physical health and lifespan. A good psychological status makes the elderly obtain happiness and pleasure and enhances their body's immunity and resistance [5].

The elderly have a high incidence of chronic non-communicable diseases (CNCDs). CNCDs have a prolonged condition, which requires long-term treatment, nursing and treatment [6]. These diseases and the cost, care and pressure brought by them seriously affect the mental health of the elderly. Studies have demonstrated that depression is closely related to the progression, prognosis and quality of life in the elderly with CNCDs such as diabetes, hypertension and coronary heart diseases [7-9]. Therefore, understanding the mental health status of the elderly with CNCDs in the community and analyzing its related factors are expected to provide basis for improving the quality of life of the elderly.

Methods

Study participants

This is a cross-sectional study. Eligible subjects from Shuangbei Community Health Service Center in Shapingba District (Chongqing, China) were continuously enrolled from June to September 2021. The inclusion criteria were patients with age ≥60 years and at least one chronic disease. The diagnosis of chronic diseases was based on the diagnosis reports from at least second-class hospitals. Exclusion criteria were patients with psychiatric diseases and consciousness disorder. This study was approved by the Ethics Committee of Community Health Service Center of Shuangbei (Shapingba District, Chongqing, China) and all subjects provided informed consent.

Data collection

A face-to-face questionnaire survey was conducted. Investigators were trained to unify investigation procedures and methods. A questionnaire was designed to collect basic information, personal health status and lifestyle. Lifestyle included smoking status, alcohol

consumption, physical activity and sleep status. Smoking was defined as having smoked more than 100 cigarettes in the past. Drinking was defined as consuming alcohol at least once a week. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ). According to IPAQ, the metabolic equivalent (MET) values of low (such as walking), medium (such as fast walking, cycling, etc.) and high-intensity activities (such as lifting heavy objects, running, etc.) are assigned as 3.3, 4.0 and 8.0 respectively, and the sum value of each intensity activity level in a week was calculated. A sum value < 600 MET•min•week^{-1} was defined as low-intensity physical activity, between 600 and 3000 MET•min•week^{-1} as medium-intensity physical activity, and ≥3000 MET•min•week^{-1} as high-intensity physical activity [10]. Sleep status was investigated using the Pittsburgh Sleep Quality Index (PSQI) scale with a total score of 21. The scale consists of seven components, including subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction [11,12]. PSQI score > 7 was defined a sleep disorder.

Mental health status was assessed using the Depression Anxiety Stress Scale-21 (DASS-21 scale), which consists of 3 dimensions including stress (7 items), anxiety (7 items), depression (7 items). The score of each dimension is twice the total score of each item [13]. A score of >14 on the stress dimension indicates an abnormal level of stress, a score of >7 on the anxiety dimension indicates anxiety, and a score of >9 on the depression dimension indicates depression [14]. The general abnormal mental status is defined as any one of the three dimensions abnormal.

Statistical analyses

The descriptive statistics are presented as frequency counts and proportions for categorical data, and median and interquartile ranges (IQR) for continuous variables that were not normally distributed. To test the differences in medians and proportions between two groups, we used a Mann-Whitney U test and a chi-square test, respectively. A multivariate logistic regression was used to evaluate the factors associated with each mental health dimension to estimate odds ratios (OR) and 95% confidence intervals (CI). All statistical analyses were performed using the SPSS statistical software (version 25.0; SPSS Inc., Chicago, IL, USA). A two sided P value < 0.05 was considered to be statistically significant.

Results

We enrolled 237 subjects consisted of 110 (46.41%) males and with a median age of 68.00 years. The majority of subjects had hypertension (n=191, 80.59%), and about half of subjects had diabetes (n=99, 41.77%) and other diseases (n=121, 51.05%). There were 51 (21.52%), 116 (48.94%) and 70 (29.54%) subjects with low, medium and high-intensity physical activities, respectively. The median sedentary time was 300.00 min/day (IQR: 180, 360). There were 29.96% (n=71) subjects with sleep disturbances. According to the DASS-21 scale, 27 (11.39%) elderly were assessed as depressed, 47 (19.83%) as anxious, 18 (7.59%) had stress, and 62 (26.16%) as general abnormal mental status (Table 1).

According to the scoring results of DASS-21 scale, the elderly with chronic diseases were divided into depression, anxiety, stress, general abnormal mental health status groups and normal group. The

Table 1: Basic information and mental health of the community elderly with chronic non-communicable diseases.

Characteristics	Values (n=237)
Age (years)	68.00 (66.00, 75.00)
Gender	
Male	110 (46.41%)
Female	127 (53.59%)
Hypertension	
Yes	191 (80.59%)
No	46 (19.41%)
Diabetes	
Yes	99 (41.77%)
No	138 (58.23%)
Other diseases	
Yes	121 (51.05%)
No	116 (48.95%)
Smoking history	
Yes	80 (33.76%)
No	157 (66.24%)
Drinking history	
Yes	61 (25.74%)
No	176 (74.26%)
Physical activities	
Low	51 (21.52%)
Medium	116 (48.94%)
High	70 (29.54%)
Sedentary time (min)/day	300.00 (180.00, 360.00)
Sleep status	
Normal	166 (70.04%)
Disorder	71 (29.96%)
Depression status	
Normal	210 (88.61%)
Depression	27 (11.39%)
Anxiety status	
Normal	190 (80.17%)
Anxiety	47 (19.83%)
Stress status	
Normal	219 (92.41%)
Stress	18 (7.59%)
General mental status	
Normal	175 (73.84%)
Abnormal	62 (26.16%)

Continuous variables were expressed as median (IQR) and categorical variables as frequencies (percentages).

characteristics between the normal group and each abnormal group were compared (Table 2). The results showed that sedentary time in the depression group (median 300min) was significantly higher than that in the normal group (median 240min) (P=0.008). The rate of

Table 2: Comparison of characteristics between abnormal and normal group by different mental health dimensions.

Variables	Normal group (n=175)	Depression (n=27)	P value (Depression vs. normal)	Anxiety (n=47)	P value (Anxiety vs. normal)	Stress (n=18)	P value (Stress vs. normal)	General mental health abnormal (n=62)	P value (General abnormal vs. normal)
Gender (n (%))			0.071		0.003		0.872		0.004
Male	91 (52.00)	9 (33.33)		13 (27.66)		9 (50.00)		19 (30.65)	
Female	84 (48.00)	18 (66.67)		34 (72.34)		9 (50.00)		43 (69.35)	
Age (years)	69 (66.00, 76.00)	68 (66.00, 73.00)	0.984	68 (66.00, 74.00)	0.798	67 (64.75, 69.25)	0.081	68 (66.00, 74.00)	0.756
Hypertension (n (%))			0.172		0.019		0.151		0.063
Yes	146 (83.43)	19 (70.37)		32 (68.09)		12 (66.67)		45 (72.58)	
No	29 (16.57)	8 (29.63)		15 (31.91)		6 (33.33)		17 (27.42)	
Diabetes (n (%))			0.390		0.151		0.384		0.219
Yes	69 (39.43)	13 (48.15)		24 (51.06)		9 (50.00)		30 (48.39)	
No	106 (60.57)	14 (51.85)		23 (48.94)		9 (50.00)		32 (51.61)	
Other diseases (n (%))			0.385		0.383		0.076		0.691
Yes	88 (50.29)	16 (59.26)		27 (57.45)		13 (72.22)		33 (53.23)	
No	87 (49.71)	11 (40.74)		20 (42.55)		5 (27.78)		29 (46.77)	
Smoking history (n (%))			0.257		0.078		0.750		0.064
Yes	65 (37.14)	7 (25.93)		11 (23.40)		6 (33.33)		15 (24.19)	
No	110 (62.86)	20 (74.07)		36 (76.60)		12 (66.67)		47 (75.81)	
Drinking history (n (%))			0.484		0.165		0.115		0.508
Yes	47 (26.86)	9 (33.33)		8 (17.02)		8 (44.44)		14 (22.58)	
No	128 (73.14)	18 (66.67)		39 (82.98)		10 (55.56)		48 (77.42)	
Physical activities (n (%))			0.282		0.353		0.825		0.283
Low	35 (20.00)	9 (33.33)		14 (29.79)		4 (22.22)		16 (25.81)	
Medium	91 (52.00)	11 (40.74)		21 (44.68)		8 (44.45)		25 (40.32)	
High	49 (28.00)	7 (25.93)		12 (25.53)		6 (33.33)		21 (33.87)	
Sedentary time [min] /day	240 (180.00, 360.00)	300 (240.00, 480.00)	0.008	360 (240.00, 480.00)	0.004	360 (240.00, 420.00)	0.061	300 (240.00, 480.00)	0.002
Sleep status (n (%))			<0.001		<0.001		<0.001		<0.001
Normal	138 (78.86)	11 (40.74)		19 (40.43)		4 (22.22)		28 (45.16)	
Disorder	37 (21.14)	16 (59.26)		28 (59.57)		14 (77.78)		34 (54.84)	

Continuous variables were expressed as median (IQR) and categorical variables as frequencies (percentages).
A Mann-Whitney U test and a chi-square test were used to test the differences in medians and proportions between two groups, respectively.

sleep disorder was significantly higher in depression group (59.26%) than that in the normal group (21.14%) (P<0.001). There were more women (72.34%) and less patients with hypertension (68.09%) in the anxiety group than in normal group (P<0.05). The sedentary time in the anxiety group (median 360min) was significantly higher than that in normal group (median 240min) (P=0.004). More patients with sleep disorders were found in the anxiety group (59.57%) than in normal group (21.14%) (P<0.001). The rate of sleep disorders in the stress group (77.78%) was significantly higher than that in normal group (21.14%) (P<0.001) (Table 2).

For the general mental health, there were more women (69.35%) in general abnormal mental health status group than in normal group (P=0.004). The sedentary time in the abnormal group (median 300min) was significantly higher than that in normal group (median 240min) (P=0.002). The rate of sleep disorders in the abnormal mental group (54.84%) was also significantly higher than that in normal group (21.14%) (P<0.001) (Table 2).

A multivariate logistic regression was performed to evaluate the factors associated with each mental health dimension. The results indicated that drinking was significantly associated with depression with an OR (95% CI) of 5.51(1.05-28.76). Sleep disorder was an independent risk factor for depression, anxiety, stress and general abnormal mental status with ORs (95% CI) of 2.99 (1.20-7.48), 4.61 (2.13-9.95), 10.78 (2.59-44.87) and 4.14 (2.04-8.40), respectively.

Table 3: Multivariate logistic regression analysis of related factors of mental health in different dimensions.

Variables	Depression		Anxiety		Stress		General abnormal	
	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Gender								
Male	Reference		Reference		Reference		Reference	
Female	3.30 (0.54-20.36)	0.199	2.93 (0.74-11.60)	0.127	0.50 (0.07-3.53)	0.485	3.23 (1.01-10.29)	0.048
Age	1.00 (0.94-1.07)	0.949	0.98 (0.94-1.04)	0.530	0.92 (0.84-1.00)	0.040	0.98 (0.94-1.03)	0.467
Hypertension history								
No	Reference		Reference		Reference		Reference	
Yes	0.64 (0.21-1.92)	0.426	0.44 (0.18-1.09)	0.076	0.50 (0.11-1.95)	0.297	0.59 (0.25-1.38)	0.223
Diabetes history								
No	Reference		Reference		Reference		Reference	
Yes	1.39 (0.53-3.62)	0.499	1.58 (0.72-3.44)	0.253	1.14 (0.32-4.08)	0.837	1.47 (0.72-3.00)	0.289
Other diseases								
No	Reference		Reference		Reference		Reference	
Yes	1.22 (0.48-3.09)	0.675	1.23 (0.57-2.68)	0.598	2.48 (0.72-8.48)	0.149	1.02 (0.51-2.05)	0.961
Smoking history								
Never	Reference		Reference		Reference		Reference	
Smoking or quitting	0.49 (0.08-2.90)	0.435	1.41 (0.32-6.09)	0.650	0.22 (0.03-1.43)	0.113	0.82 (0.24-2.81)	0.755
Drinking history								
Never	Reference		Reference		Reference		Reference	
Drinking or quitting	5.51 (1.05-28.76)	0.043	0.65 (0.19-2.18)	0.482	3.26 (0.65-16.43)	0.151	1.62 (0.56-4.69)	0.377
Physical activities								
Low	Reference		Reference		Reference		Reference	
Medium	0.48 (0.17-1.33)	0.157	0.53 (0.22-1.26)	0.149	1.11 (0.26-4.72)	0.888	0.57 (0.25-1.29)	0.177
High	0.63 (0.20-2.02)	0.436	0.62 (0.23-1.67)	0.339	1.56 (0.31-7.76)	0.588	1.27 (0.51-3.11)	0.609
Sedentary time								
≤ 4 hours/day	Reference		Reference		Reference		Reference	
> 4 hours/day	2.146 (0.82-5.60)	0.118	2.10 (0.97-4.54)	0.060	2.40 (0.65-8.83)	0.187	2.33 (1.15-4.72)	0.018
Sleep disorder								
No	Reference		Reference		Reference		Reference	
Yes	2.99 (1.20-7.48)	0.019	4.61 (2.13-9.95)	<0.001	10.78 (2.59-44.87)	0.001	4.14 (2.04-8.40)	<0.001

A multivariate logistic regression was used to evaluate the factors associated with each mental health dimension to estimate odds ratios (OR) and 95% confidence intervals (CI).

Gender and sedentary time were independently associated with general abnormal mental health status, and the ORs (95% CI) for women elderly and patients with sedentary time>4 hours per day were 3.23 (1.01-10.29) and 2.33 (1.15-4.72), respectively (Table 3).

Discussion

In this cross-sectional study, we found that the overall abnormal rate of mental health status in the community elderly with CNCDs was 26.16%, including the prevalence of depressive was 11.39%, anxiety 19.83%, and stress 7.59%. Female, drinking, sedentary lifestyle and sleep disorder may be independent risk factors of abnormal mental health status.

Mental health is one of the important factors to evaluate the quality of life, and it is also one of the important factors affecting the physical health of the elderly. Some studies had shown that even after controlling the confounding factors, there was a strong interaction between mental health and physical health [15]. A study focused on community elderly reported the prevalence of depression was 33.5%, 17.6% and 14.6-17.2% in Japan, Britain, and America [7]. Additionally, Meng et al. [16] showed that the prevalence of depressive in Chinese adults was 17.96%. The study by Shi et al. reported that 6.5% of the surveyed elderly were defined as having anxiety symptoms [17]. Our results demonstrated 11.39%, 19.83%, 7.59% prevalence of depression, anxiety and stress in the elderly, respectively. Compared with the results of others studies, our prevalence of depressive symptoms was lower, but the rate of anxiety was higher, which may be due to the different scales for assessing mental health, and different characteristics of subjects from different regions.

Our study found that female could be an independent risk factor for general abnormal mental health status. Previous studies showed

that older women were more likely to experience common mental disorders such as depression and anxiety than older men [18,19], which were consistent with our results.

The longer the sedentary time, the more likely the elderly were to have symptoms such as depression and anxiety. Chastin et al. [20] conducted a cross-sectional survey and also found that sedentary behavior in the elderly was a risk factor for depression. Park et al. [21] investigated the relationship between sedentary behavior and depression of the elderly in the British community, and found that the elderly with a sedentary lifestyle were more prone to depression. Ashdown-Franks et al. [22] investigated the association between sedentary behavior and stress in adults over 50 years old and found that the average stress scores in individuals with sedentary time 4-8, 8-11 and ≥ 11 hours/day were 1.97, 7.11 and 9.02 times higher than those with sedentary time ≤ 4 hours/day, respectively. This line of evidence confirmed our finding that sedentary time was an independent risk factor for general abnormal mental status.

A previous study [23] showed that poor sleep quality was significantly positively correlated with depression (OR=1.58) and anxiety (OR=1.38) (P = 0.001). Metse et al. [24] also confirmed that the prevalence of sleep disorder in persons with abnormal mental health was at least twice that in persons with normal mental health. Meanwhile, a study [25] demonstrated that severe sleep problems significantly increased depression, anxiety and stress in non-clinical population. A longitudinal study on 686 male college students found that the overall score of sleep quality was positively correlated with the scores of depression, anxiety and stress [26]. In this study, we found that sleep disorders was an independent risk factor for poor mental health, which was consistent with the results of other studies.

With regard to the impact of smoking and drinking on mental health, research [27] showed that there was a significant relationship between smoking and mental health. The possible explanation was that nicotine might lead to poor mental health by changing neurotransmitter pathways. In our study, no association was found between metal health and smoking, which was inconsistent with other studies. The reasons could be the small sample size of our survey and different characteristics of subjects. However, our results indicated that drinking was independently associated with depression. There was a two-way correlation between alcohol consumption and mental health, and the existence of one problem almost doubles the risk of another [28].

Our study has several limitations. Firstly, the subjects were enrolled from a single community and the sample size was small, which may lead to the limited representativeness of the results. Secondly, other mental health-related factors, such as social support and side effects caused by chronic disease treatment, were not be involved in this study, and could be further explored in future research.

Conclusion

In conclusion, our study found that the elderly with CNCDs in the community have a high abnormal rate of mental health. Drinking, sedentary lifestyle, sleep disorders and female were potential independent risk factors for abnormal mental health. Our findings suggest the necessity of paying more attention to the mental health of the elderly suffering from with CNCDs in the community, and

provide a basis for future intervention.

Declaration

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