

RESEARCH

Open Access



Anxiety and depression in thymoma patients in China before surgery

Jiaduo Li, Guoyan Qi* and Yaling Liu

Abstract

Background: The study's goal was to investigate the percentage of anxiety and depression in Chinese thymoma patients before surgery, and also the factors that influence it.

Methods: The study included patients who had an anterior mediastinal mass discovered by chest CT and were scheduled for video-assisted thoracoscopic surgery. The mental health rating scales were completed by all patients before surgery. Patients were divided into two groups based on the Hospital Anxiety and Depression Scale (HADS): anxiety/depression and non-anxiety/depression. The association between thymoma clinical factors and the HADS score was studied statistically.

Results: The study comprised eighty patients with thymoma. Before the operation, 22.5% (18/80) of the patients had anxiety and/or depression. The resigned coping style characteristics, along with myasthenia gravis (MG), were associated with preoperative anxiety and depression. The greater the score of the resigned dimension, the greater the risk of anxiety and depression, based on the results of logical regression analysis. Thymoma patients with myasthenia gravis have a higher risk of anxiety and depression.

Conclusion: Patients with myasthenia gravis and resigned coping style were found to have higher anxiety and depression before surgery for Chinese thymoma patients.

Keywords: Thymoma, Anxiety, Depression, Related factors

Introduction

Patients with malignant tumors most often suffer from anxiety and depression, which can compromise their tolerance to the tumor and affect the outcome of treatment [1]. In the past several years, an increasing number of studies have started paying attention to the consequences of anxiety and depression in patients with tumors. In order to understand the role of anxiety and depression in malignant tumors, it is necessary to first determine their percentage and the variables that affect them. The studies on the incidence and contributing variables of anxiety and depression in malignant tumors have been

increasing, including lung cancer, gastric cancer, breast cancer, and so on [2–4]. However, in thymoma, there is a lack of related research. Thymoma is the most common anterior mediastinal tumor, and nearly 30% of thymoma patients are complicated with myasthenia gravis [5–7]. Patients with myasthenia gravis have an increased risk of depression, and its severity is significantly correlated with depression, according to previous research [8, 9]. However, many of these studies were associated with thymoma, and the results were limited to the relationship between myasthenia gravis and depression, ignoring the effect of thymoma on psychological factors. Therefore, it is necessary to carry out relevant investigations to understand the psychological factors of patients with thymoma. The study's primary aim is to evaluate the preoperative anxiety and depression of thymoma patients and explore the related influencing factors.

*Correspondence: guoyanqi2019@163.com

Center of Treatment of Myasthenia Gravis, People's Hospital of Shijiazhuang
Affiliated to Hebei Medical University, Shijiazhuang, Hebei Province, China



© The Author(s) 2022. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

Methods

Patients and methods patients

Patients with anterior mediastinal tumors who received treatment at the Thoracic Surgery Department, People's Hospital of Shijiazhuang, Hebei Province, from October 2020 to October 2021 were comprised in this cross-sectional research. The following were the criteria for inclusion: (I) anterior mediastinal mass was discovered by chest CT before surgery, and thymoma was diagnosed clinically and pathologically after surgery; (II) age > 18; (III) thoracoscopy surgery was planned; (IV) agreed to participate and cooperate with the inquiry. The following were the exclusion criteria: (I) inability to communicate accompanied by psychological or mental illness; (II) using anti-anxiety or antidepressants within one week of the study's start; (III) history of a malignant tumor. The Ethics Committee of People's Hospital of Shijiazhuang has given this study its ethical approval (Approval number 202094). All of the patients gave their informed consent orally and were approved by the ethics committee. All methods were performed in accordance with the Declaration of Helsinki.

Investigation

On the day before surgery, patients in this study completed an independent self-questionnaire. If the patient has difficulty filling out the questionnaire, the medical staff will assist them in completing it. Their sociodemographic status (e.g., age, gender, insurance status), personal and family history, and lifestyle were all noted on the questionnaire. The following are the questionnaires that were utilized in our research.

The hospital Anxiety and Depression Scale (HADS) is divided into two subscales that assess anxiety and depression [10]. In our research, the Chinese version of HADS was used. HADS is a reliable and valid measure of anxiety and depression [11, 12]. Each subscale has 7 items with scores varying between 0 to 21. A score of 11–21 indicates anxiety or depression. Higher anxiety or depression levels are indicated by higher scores. Patients were separated into two groups according to their HADS scores. The anxiety/depression group included people who had anxiety and/or depression, while the non-anxiety/depression group included those who did not have anxiety or depressive symptoms.

The Medical Coping Mode Questionnaire (MCMQ) is a tool for determining a patient's coping style [13]. In Chinese cancer patients, the MCMQ has been frequently employed [14, 15]. The MCMQ consists of 20 items with scores ranging from 1 (never) to 4 (very high), split into three dimensions: confrontive, avoidant, and resigned. The higher a patient's score on a certain dimension, the more likely he or she is to pick a coping mode.

The Social Support Rating Scale (SSRS) is a tool for determining social assistance. The validity and reliability of the SSRS scale are excellent [16]. The survey consists of ten questions. The questions ask about people's social support at three levels: objective support, subjective support, and support utilization. Higher scores indicate that the individual receives more social support outside of the immediate family.

The type D scale-14 (DS-14) was used to evaluate type D personality [17]. Two subscales of the DS-14 were used to assess this: negative affectivity (NA) and social inhibition (SI). Each subscale has seven items. Previous studies have shown that DS-14 has high reliability and validity when it was translated into Chinese [18].

Statistical analyses

All the analysis on the data were conducted using SPSS 21.0 for Windows. For descriptive statistics, the mean, standard deviation (SD), number (n), and percentage were utilized. Continuous data were compared using the non-paired t-test. Comparing categorized data was done with the χ^2 test and Fisher's exact test. The clinical factors were studied using logistic regression analysis. Any clinical factors with a $P < 0.05$ in the univariate analysis were included in the multivariate logistic regression analysis. A significance level of 0.05 was used to determine if the results were statistically significant.

Results

Eighty-four patients diagnosed with anterior mediastinal mass preoperatively participated in our research. According to the postoperative pathology, 80 cases were diagnosed as thymoma, 3 cases were thymic cysts, and 1 case was teratoma. These 80 patients with thymoma became the final study subjects. Table 1 showed their demographic and medical characteristics. The presence of preoperative anxiety and depression before surgery in thymoma patients was 22.5% (18/80). The grouping was determined according to the HADS score. Eighteen patients were classified as being in the anxiety/depression group. Among them, 3 were anxious, 6 were depressed, and 9 were anxious and depressed. The non-anxiety/depression group was made up of the other 62 patients.

There was a significant difference in the proportion of myasthenia gravis between the anxiety and depression group and the non-anxiety and depression group ($P < 0.05$), as shown in Table 1. The two groups' MCMQs revealed no significant difference between their confrontive and avoidant aspects. On the other hand, the anxiety/depression group's resigned score was much greater than the control group's.

When comparing the SSRS, the findings suggest that they received similar support in terms of objective

Table 1 Patients with thymoma's demographic and clinical characteristics, and scale test results

Variables	Non-anxiety/depression group	Anxiety/depression group	<i>p</i>
Age (median [IQR])(year)	45.77 [38.12, 52.81]	44.97 [39.19, 50.09]	0.836
Sex = Female/Male (%)	20/42 (32.3/67.7)	8/10 (44.4/55.6)	0.501
Insurance = yes (%)	43 (69.4)	16 (88.9)	0.176
MG = yes (%)	14 (22.6)	9 (50.0)	0.049
<i>WHO subtypes (%)</i>			0.916
A	8 (12.9)	2 (11.1)	
AB	2 (3.2)	1 (5.6)	
B1	15 (24.2)	5 (27.8)	
B2	27 (43.5)	6 (33.3)	
B3	10 (16.1)	4 (22.2)	
<i>Masaoka stage (%)</i>			0.972
I	24 (38.7)	6 (33.3)	
II	21 (33.9)	7 (38.9)	
III	13 (21.0)	4 (22.2)	
IV	4 (6.5)	1 (5.6)	
<i>Coping mode</i>			
Confrontive (mean (SD))	17.32 (2.99)	18.67 (3.18)	0.102
Avoidant (mean (SD))	14.58 (2.98)	14.94 (2.15)	0.632
Resigned (median [IQR])	10.00 [9.00, 11.75]	12.00 [11.00, 12.00]	0.001
<i>Type of support</i>			
Objective (median [IQR])	10.00 [10.00, 11.00]	10.50 [10.00, 11.00]	0.591
Subjective (median [IQR])	25.00 [22.00, 26.00]	24.50 [23.00, 26.75]	0.651
Utilization (median [IQR])	7.00 [6.00, 8.00]	7.00 [6.00, 8.00]	0.402
TypeD = no/yes (%)	38/24 (61.3/38.7)	6/12 (33.3/66.7)	0.067

WHO World Health Organization

support, subjective support, and utilization of support. The proportion of Type D personalities was not significantly different between the two groups, according to the DS-14 test findings.

Univariate analysis showed that myasthenia gravis, coping style and type D personality were closely associated with anxiety and depression ($P < 0.05$), as shown in Table 2. As demonstrated in Table 3, myasthenia gravis and coping style were independent risk variables for anxiety and depression in multivariate analysis.

Discussion

As mentioned in the literature review, stress and depression can lead to impaired immune response and may promote the occurrence and development of tumors [16]. Very little was found in the literature on the question of thymoma and psychological factors. This study is the first to cross-sectionally investigate the percentage of anxiety/depression and its associated variables in thymoma patients.

In China, cancer patients often suffer from both depression and anxiety [1]. In this research, 50% (9/18) of thymoma patients had anxiety-depression comorbidities.

Anxiety-depression comorbidities were found to be 45.5 percent in cervical cancer and 68.5 percent in bladder and kidney cancer in previous investigations [19, 20]. This is significant because comorbid mental disorders are connected with more serious symptoms, poorer outcomes, and more medical resource utilization than single mental diseases [21].

In this study, preoperative anxiety and depression were shown to be prevalent in 22.5 percent of thymoma patients, which was lower than that of other different types of tumors [18–20, 22]. The disparity in percentage could be due to two factors. First, thymoma was relatively rare, the incidence rate was 0.15 per 100,000 person-years, so it was easy to be ignored [6]. In addition, a good prognosis may reduce the incidence of anxiety and depression in thymoma. Thymoma has a favorable prognosis, as the five-year overall survival rate was around 90% [21]. Thymoma has a five-year median survival rate of 69 percent in advanced illnesses [23].

Coping style is the key factor affecting the outcome of stressful events. Different coping styles will lead to different emotional states [24]. The anxiety/depression group had a higher resigned dimension than the

Table 2 Univariate analysis of anxiety/depression among 80 thymoma patients

Variables	POR	95% CI	P value
Age (year)	0.99	0.94–1.05	0.82
Sex	0.6	0.2–1.74	0.34
Medical insurance	3.53	0.74–16.92	0.11
Myasthenia gravis	3.43	1.14–10.29	0.03
<i>WHO pathological type</i>			
A	–		
AB	2	0.11–34.82	0.63
B1	1.33	0.21–8.49	0.76
B2	0.89	0.15–5.29	0.9
B3	1.6	0.23–11.08	0.63
<i>Masaoka stage</i>			
I	–		
II	1.33	0.39–4.6	0.65
III	1.23	0.29–5.16	0.78
IV	1	0.09–10.66	1
<i>MOMC</i>			
Confrontive	1.17	0.97–1.41	0.11
Avoidant	1.05	0.87–1.27	0.63
Resigned	1.44	1.11–1.88	0.01
<i>SSRS</i>			
Objective	1.15	0.73–1.8	0.55
Subjective	1.05	0.85–1.29	0.66
Utilization	0.85	0.61–1.19	0.35
Type D Personality	3.17	1.05–9.56	0.04

POR The prevalence odds ratio

Table 3 Multivariate analysis of anxiety/depression among 80 thymoma patients

Variables	POR	95% CI	P-value
<i>Myasthenia gravis</i>			
No	–		
Yes	5.34	1.49–19.18	0.01
<i>MOMC</i>			
Resigned	1.59	1.17–2.18	0.003

POR The prevalence odds ratio

non-anxiety/depression group in this research. The MCMQ’s confrontive and avoidant components, however, showed no significant differences. Patients with diseases with little hope of recovery are more likely to use “resigned” coping strategies [25, 26]. Based on the data, the group in anxiety/depression chose to use the strategy of “resigned”. Using this coping strategy may worsen an individual’s symptoms of anxiety and depression. Preoperative psychological counseling for patients

suffering anxiety and depression may be helpful in assisting them establish a more positive coping style.

Studies have found that social support is a protective factor for mental health [27, 28]. Individuals might benefit from social support to avoid stress and poor health [29, 30]. In various studies, social support has been shown to have a significant role in improving mental health, and this link applies to cancer patients as well [27, 28, 31, 32]. The social support in the two groups was not significantly different in this study. The results of this survey indicate that the needs of thymoma patients in Chinese medical settings are mostly satisfied by three kinds of assistance, namely material, psychological, and therapeutic assistance.

Anxiety and depression are linked to Type D personalities [33]. According to previous research, cancer patients who have type D personalities tended to experience anxiety and depression [34]. In the univariate analysis, the researchers found that the type D personality was associated with anxiety and depression. However, in multivariate analysis, anxiety and depression were not significantly influenced by type D personality. It’s thought that the cause of the problem is a combination of type D personality and other factors. Personality types have been proven in some research to predict and influence coping styles [35, 36]. Adaptive personality qualities are significantly related to active coping methods in some studies [37, 38]. The “resigned” coping style is a negative coping style. Maladaptive personality traits and poor coping styles have a high association [39, 40]. Individuals with maladaptive personalities were more likely to experience psychological discomfort because they were likely to utilize a maladaptive coping style, according to the relationship between personality and coping styles.

According to our findings, myasthenia gravis is an independent factor of anxiety and depression. Myasthenia gravis is a chronic disease that hurts one’s life quality and can lead to anxiety and depression. Patients suffering from MG have long been thought to experience depressive symptoms [41, 42]. Previous research has found that the severity of myasthenia gravis is strongly linked to depression [9]. The early improvement of the condition with suitable MG treatment may be helpful for thymoma patients with myasthenia gravis to lessen anxiety and sadness.

There are a few limitations in our research. First, because the sample we studied came from an oncology institution, we should proceed with caution in drawing conclusions from the current findings. Second, the HADS used in this study is mainly used to screen anxiety and depression among patients in general hospitals. Third, more research is needed to see if the findings of the current study apply to other thymoma samples and

diverse cultural contexts. Fourth, in addition to coping style, social support, and type D personality, we should further explore the factors related to psychological disorders. Finally, this study employed a cross-sectional approach. As a result, the data cannot be used to infer causality. To confirm the current findings, more longitudinal investigations are needed.

Conclusion

In summary, this research found that the frequency of preoperative anxiety and depression in Chinese patients with thymoma is low when compared to other tumors, and that its incidence is influenced by coping strategies and myasthenia gravis. The observations indicate that before thymoma surgery, medical staff should provide adequate cognitive coaching so that patients can develop a positive coping style and reduce myasthenia gravis symptoms early.

Acknowledgements

None.

Author contributions

JD, YL, and GY: conceptualization, methodology, draft preparation, and supervision. JD and YL: writing-reviewing and editing, data collection, and draft preparation. JD and GY: visualization, investigation, software, data collection, and draft preparation. All authors contributed to the article and approved the submitted version.

Funding

Shijiazhuang Science and Technology Bureau funded this research (Grant No. 201460603). This work was also supported by financial grants from the Hebei Provincial Natural Science Foundation (H2019106063) and the S&T Program of Hebei (19277701D).

Availability of data and materials

The original contributions presented in the study are included in the article, further inquiries can be directed to the corresponding author.

Declarations

Ethics approval and consent to participate

The Ethics Committee of People's Hospital of Shijiazhuang has given this study its ethical approval (Approval number 202094). All of the patients gave their informed consent orally and were approved by the ethics committee. All methods were performed in accordance with the Declaration of Helsinki.

Competing interests

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Received: 8 June 2022 Accepted: 10 December 2022

Published online: 16 December 2022

References

- Yang Y-L, Liu L, Wang Y, Wu H, Yang X-S, Wang J-N, et al. The prevalence of depression and anxiety among Chinese adults with cancer: a systematic review and meta-analysis. *BMC Cancer*. 2013;13:393.
- Iwatani T, Matsuda A, Kawabata H, Miura D, Matsushima E. Predictive factors for psychological distress related to diagnosis of breast cancer. *Psychooncology*. 2013;22:523–9.
- Xu L, Pan Q, Lin R. Prevalence rate and influencing factors of preoperative anxiety and depression in gastric cancer patients in China: Preliminary study. *J Int Med Res*. 2016;44:377–88.
- Huang X, Zhang T-Z, Li G-H, Liu L, Xu G-Q. Prevalence and correlation of anxiety and depression on the prognosis of postoperative non-small-cell lung cancer patients in North China. *Medicine*. 2020;99:e19087.
- Engels EA, Pfeiffer RM. Malignant thymoma in the United States: demographic patterns in incidence and associations with subsequent malignancies. *Int J Cancer*. 2003;105:546–51.
- Engels EA, Engels EA. Epidemiology of thymoma and associated malignancies. *J Thorac Oncol*. 2010;5:260–5.
- Zekeridou A, McKeon A, Lennon VA. Frequency of synaptic autoantibody accompaniments and neurological manifestations of thymoma. *JAMA Neurol*. 2016;73:853–9.
- Alanazy MH. Prevalence and associated factors of depressive symptoms in patients with myasthenia gravis: a cross-sectional study of two tertiary hospitals in Riyadh. *Saudi Arabia Behav Neurol*. 2019;2019:9367453.
- Bogdan A, Barnett C, Ali A, AlQwaifi M, Abraham A, Mannan S, et al. Chronic stress, depression and personality type in patients with myasthenia gravis. *Eur J Neurol*. 2020;27:204–9.
- Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand*. 1983;67:361–70.
- Brennan C, Worrall-Davies A, McMillan D, Gilbody S, House A. The hospital anxiety and depression scale: a diagnostic meta-analysis of case-finding ability. *J Psychosom Res*. 2010;69:371–8.
- Hinz A, Krauss O, Hauss JP, Höckel M, Kortmann RD, Stolzenburg JU, et al. Anxiety and depression in cancer patients compared with the general population. *Eur J Cancer Care*. 2010;19:522–9.
- Feifel H, Strack S, Nagy VT. Coping strategies and associated features of medically ill patients. *Psychosom Med*. 1987;49:616–25.
- Li L, Li S, Wang Y, Yi J, Yang Y, He J, et al. Coping profiles differentiate psychological adjustment in Chinese women newly diagnosed with breast cancer. *Integr Cancer Ther*. 2017;16:196–204.
- Liu Z, Zhang L, Cao Y, Xia W, Zhang L. The relationship between coping styles and benefit finding of Chinese cancer patients: the mediating role of distress. *Eur J Oncol Nurs Off J Eur Oncol Nurs Soc*. 2018;34:15–20.
- Reiche EMV, Nunes SOV, Morimoto HK. Stress, depression, the immune system, and cancer. *Lancet Oncol*. 2004;5:617–25.
- Hirschfeld RMA. The comorbidity of major depression and anxiety disorders: recognition and management in primary care. *Prim Care Companion J Clin Psychiatry*. 2001;3:244–54.
- Bodurka-Bevers D, Basen-Engquist K, Carmack CL, Fitzgerald MA, Wolf JK, de Moor C, et al. Depression, anxiety, and quality of life in patients with epithelial ovarian cancer. *Gynecol Oncol*. 2000;78:302–8.
- Cordova MJ, Giese-Davis J, Golant M, Kronenwetter C, Chang V, Spiegel D. Breast cancer as trauma: posttraumatic stress and posttraumatic growth. *J Clin Psychol Med Settings*. 2007;14:308–19.
- Sharpley CF, Christie DRH. An analysis of the psychometric profile and frequency of anxiety and depression in Australian men with prostate cancer. *Psychooncology*. 2007;16:660–7.
- Masaoka A. Staging system of thymoma. *J Thorac Oncol*. 2010;5(10):S304–12.
- Sharpley CF, Bitsika V, Christie DRH. Understanding the causes of depression among prostate cancer patients: development of the effects of prostate cancer on lifestyle questionnaire. *Psychooncology*. 2009;18:162–8.
- Scorsetti M, Leo F, Trama A, D'Angelillo R, Serpico D, Macerelli M, et al. Thymoma and thymic carcinomas. 2016; Available from: <https://www.semanticscholar.org/paper/0967a9c7b40458a2b592e8207e57c012f1a1d526>
- Folkman S, Lazarus RS. If it changes it must be a process: study of emotion and coping during three stages of a college examination. *J Pers Soc Psychol*. 1985;48:150–70.
- Montes-Berges B, Augusto J-M. Exploring the relationship between perceived emotional intelligence, coping, social support and mental health in nursing students. *J Psychiatr Ment Health Nurs*. 2007;14:163–71.
- Fiori KL, Denckla CA. Social support and mental health in middle-aged men and women: a multidimensional approach. *J Aging Health*. 2012;24:407–38.

27. Rothon C, Goodwin L, Stansfeld S. Family social support, community "social capital" and adolescents' mental health and educational outcomes: a longitudinal study in England. *Soc Psychiatry Psychiatr Epidemiol.* 2012;47:697–709.
28. Cao X, Yang C, Wang D. The impact on mental health of losing an only child and the influence of social support and resilience. *Omega.* 2020;80:666–84.
29. Penwell LM, Larkin KT. Social support and risk for cardiovascular disease and cancer: a qualitative review examining the role of inflammatory processes. *Health Psychol Rev.* 2010;4:42–55.
30. Blazer A, Dey ID, Nwaukoni J, Reynolds M, Ankrah F, Algasas H, Ahmed T, Divers J. Apolipoprotein L1 risk genotypes in Ghanaian patients with systemic lupus erythematosus: a prospective cohort study. *Lupus Sci Med.* 2021;8(1):e000460.
31. Eom C-S, Shin DW, Kim SY, Yang HK, Jo HS, Kweon SS, et al. Impact of perceived social support on the mental health and health-related quality of life in cancer patients: results from a nationwide, multicenter survey in South Korea. *Psychooncology.* 2013;22:1283–90.
32. Koelmel E, Hughes AJ, Alschuler KN, Ehde DM. Resilience mediates the longitudinal relationships between social support and mental health outcomes in multiple sclerosis. *Arch Phys Med Rehabil.* 2017;98:1139–48.
33. Starrenburg AH, Kraaier K, Pedersen SS, van Hout M, Scholten M, van der Palen J. Association of psychiatric history and type D personality with symptoms of anxiety, depression, and health status prior to ICD implantation. *Int J Behav Med.* 2013;20:425–33.
34. Mols F, Thong MS, van de Poll-Franse LV, Roukema JA, Denollet J. Type D (distressed) personality is associated with poor quality of life and mental health among 3080 cancer survivors. *J Affect Disord.* 2012;136(1–2):26–34.
35. Marnie B. The role of personality following the September 11th terrorist attacks: big five trait combinations and interactions in explaining distress and coping. *Univ Calif US.* 2008;
36. Berkel V, Kathryn H. The Relationship Between Personality, Coping Styles and Stress, Anxiety and Depression. University of Canterbury. *Psychology*; 2009 [cited 2022 Apr 12]; Available from: <https://ir.canterbury.ac.nz/handle/10092/2612>
37. Penley JA, Tomaka J. Associations among the Big Five, emotional responses, and coping with acute stress. *Personal Individ Differ Elsevier.* 2002;32:1215–28.
38. Connor-Smith JK, Flachsbart C. Relations between personality and coping: a meta-analysis. *J Pers Soc Psychol.* 2007;93:1080–107.
39. O'Brien TB, DeLongis A. The interactional context of problem-, emotion-, and relationship-focused coping: the role of the big five personality factors. *J Pers.* 1996;64:775–813.
40. Watson D, Hubbard B. Adaptational style and dispositional structure: coping in the context of the five-factor model. *J Pers.* 1996;64:737–74.
41. Köhler W. Psychosocial aspects in patients with myasthenia gravis. *J Neurol.* 2007;254(Suppl 2):90–2.
42. Kulaksizoglu IB. Mood and anxiety disorders in patients with myasthenia gravis: aetiology, diagnosis and treatment. *CNS Drugs.* 2007;21:473–81.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Ready to submit your research? Choose BMC and benefit from:

- fast, convenient online submission
- thorough peer review by experienced researchers in your field
- rapid publication on acceptance
- support for research data, including large and complex data types
- gold Open Access which fosters wider collaboration and increased citations
- maximum visibility for your research: over 100M website views per year

At BMC, research is always in progress.

Learn more biomedcentral.com/submissions

