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Depression as a risk factor associated with ocular and general somatic diseases according to the clinical and population study Ural Eye and Medical Study

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ABSTRACT

At least 20% of ophthalmological patients have clinical manifestations of depression, as a rule, such patients differ in the presence of several eye diseases.

Purpose. Based on the clinical and population study Ural Eye and Medical Study, to determine the factors that are directly related to the presence of depression among the population of the Republic of Bashkortostan aged 40 years and older.

Material and methods. The Ural Eye and Medical Study (UEMS) is a cross-sectional clinical and population-based study conducted at the Ufa Research Institute of Eye Diseases, Bashkir State Medical University, Ministry of Health of the Russian Federation, from 2015 to 2017.

Results. The prevalence of depression was 2443/5893 (41.5%; 95% CI: 40.2–42.7). According to the results of multivariate regression analysis, high levels of depression were associated with low visual acuity (p=0.02), the presence of dry eye syndrome (p=0.001), as well as with female gender (p<0.001), low education level (p=0.04), less alcohol consumption (p=0.000), less alcohol consumption (p<0,001), rare fruit consumption (p<0.001) and less salt consumption (p=0.04), and a history of frequent headaches (p=0.001), sore throat (p=0.008), pain in the thoracic spine (p<0.001), cerebrovascular diseases (p=0.03), skin diseases (p=0.006) and thyroid gland diseases (p=0.02), frequent falls (p=0.003), fainting (p<0.001), weak dynamometry (p<0.001), less physical activity (p<0.001), and hearing loss (p<0.001).

Conclusion. High correlation of depression with low visual acuity (p=0.02) and presence of dry eye syndrome (p=0.001) represents the connection between the eyes, general somatic and psychological condition of patients and a decrease in their quality of life. The obtained data emphasize that when carrying out diagnostic measures, as well as treating patients with eye diseases and general somatic diseases, it is necessary to pay attention not only to changes in ophthalmological, systemic, and laboratory parameters, but also to the psychological state of patients.

Keywords: *depression, vision loss, eye diseases, dry eye syndrome, patient psychological well-being*

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Оригинальная статья

Депрессия как фактор риска глазных и общесоматических заболеваний по данным клинико-популяционного исследования Ural Eye and Medical Study

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РЕФЕРАТ

Не менее 20% больных офтальмологического профиля имеют клинические проявления депрессии. Как правило, такие пациенты отличаются наличием нескольких глазных заболеваний. При этом как болезни глаз могут приводить к развитию депрессии, так и сама депрессия может увеличивать риск развития офтальмопатологии.

Цель. На основании клинико-популяционного исследования Ural Eye and Medical Study определить демографические, общесоматические и глазные факторы, имеющие взаимосвязь с наличием депрессии среди населения Республики Башкортостан в возрасте 40 лет и старше.

Материал и методы. Ural Eye and Medical Study (UEMS) — кросс-секционное клинико-популяционное исследование, которое проводилось в Уфимском НИИ глазных болезней ФГБОУ ВО БГМУ Минздрава России в период с 2015 по 2017 г.

Результаты. Распространенность депрессии составила 2443/5893 (41,5%; 95% ДИ 40,2–42,7). По результатам многофакторного регрессионного анализа высокий уровень депрессии был связан с низкой остротой зрения (p=0,02), наличием синдрома «сухого глаза» (p=0,001), а также с женским полом (p<0,001), низким уровнем образования (p=0,04), меньшим употреблением алкоголя (p=0,000), редким употреблением в пищу фруктов (p<0,001) и меньшим употреблением соли (p=0,04), наличием в анамнезе частых головных болей (p=0,001), ангины (p=0,008), болей в грудном отделе позвоночника (p<0,001), цереброваскулярных заболеваний (p=0,03), болезней кожи (p=0,006) и щитовидной железы (p=0,02), частых падений (p=0,003), обмороков (p<0,001), слабым показателем динамометрии (p<0,001), меньшей физической активностью (p<0,001), снижением слуха (p< 0,001).

Выводы. Выявленная корреляция депрессии с низкой остротой зрения (p=0,02) и синдромом «сухого глаза» (p=0,001) предполагает связь между заболеваниями глаз, общесоматическим и психологическим состоянием пациентов, а также снижением качества их жизни. Полученные данные подчеркивают, что при проведении диагностических мероприятий, а также при лечении пациентов с заболеваниями глаз и общими соматическими заболеваниями необходимо обращать внимание не только на изменения офтальмологических, системных и лабораторных показателей, но и на психологическое состояние пациентов.

Ключевые слова: *депрессия, снижение зрения, болезни глаз, синдром «сухого глаза», психологическое состояние пациента*

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RELEVANCE

According to the Global Burden of Diseases, Injuries, and Risk Factors Study, conducted in 2019, depression is one of the 25 most common cause of human diseases worldwide [1]. The lifetime prevalence of depression ranges from 2% to 15%, it is one of the main risk factors for disability in the world, affecting about 280 million people [2–4]. About one third part of patients with depression do not respond to standard treatment with antidepressants, despite their effectiveness, which exacerbates this problem [5].

In recent years, increasing attention has been paid to depression as a systemic disease associated with a wide range of somatic disorders. Of particular interest is its association with sensory dysfunctions. It was noted that at least 20% of patients with ophthalmological diseases have clinical manifestations of depression, as a rule, such patients are distinguished by the presence of several eye diseases [6]. At the same time, eye diseases can lead to the development of depression, and depression itself can increase the risk of developing ophthalmopathology. Current data indicate the role of common pathogenetic mechanisms, such as chronic inflammation, oxidative stress, and vascular disorders, in the development of both depression and diseases of the eye [5].

Researchers indicate that patients with diabetes mellitus and arterial hypertension and depression have an increased risk of developing complications such as diabetic and hypertensive retinopathy [7]. The presence of such comorbid conditions significantly worsens the course of depression,

worsens the prognosis, and increases the burden on the health care system.

A promising area of further research is the development of interdisciplinary approaches to patient management, taking into account the mental and somatic status.

PURPOSE

To determine demographic, general somatic and ocular factors that have a relationship with the presence of depression among the population of the Southern Urals aged 40 years and older on the basis of clinical and population study — Ural Eye and Medical Study.

MATERIAL AND METHODS

The presence study was conducted on the basis of the Ural Eye and Medical Study (UEMS), a cross-sectional clinical and population-based study that was conducted at the Ufa Eye Research Institute of Bashkir State Medical University in the period from 2015 to 2017 years. UEMS participants are residents of the Republic of Bashkortostan aged 40 years and older. Ural Eye and Medical Study was conducted in accordance with the principles of the Declaration of Helsinki and was approved by the Local Ethics Committee of the Ufa Eye Research Institute. Voluntary information consent was signed by all participants of the study. A survey of participants was conducted including questions about their social status, demographic characteristics, working and living conditions, lifestyle features, medical history, general somatic and ophthalmological examination was conducted too.

Some degree of vision loss was determined in accordance with the criteria adopted by the World Health Organization — mild, moderate, severe vision impairment and blindness [8]. During the analysis of the results, visual acuity in the better seeing eye or the only functional eye was taken into account. For the convenience of data processing, moderate and severe visual impairment were combined into one group. Depression assessment was performed using the international standardized questionnaire of the Center for Epidemiological Studies Depression Scale (CES-D) Scoresheet. Depression was determined if the questionnaire score on the scale exceeded the threshold value of 6 points [9, 10].

Statistical processing of the study results was carried out on the basis of the IBM SPSS 27.0 program. The relationship of depression with other parameters was determined by the method of linear regression. At the first stage, a univariate regression analysis was performed. At the second stage, a multivariate regression analysis was performed, which included factors (independent variables) that showed a significant correlation with the level of depression (dependent variable), and also excluded factors with high collinearity. Standardized and non-standardized regression coefficients β and B, 95% confidence interval of coefficient B, and variance inflation factor (VIF) were calculated. Values with $p<0.05$ were taken as statistically significant.

RESULTS

The current study included 5,893 participants, mean age 59.0±10.7 (range 40–94 years), including 3,315 (56.3%) women and 2,578 (43.7%) men.

According to the survey results, the average value on the depression scale among the study participants was 5.2±3.7 (median 5, range 0–19). The prevalence of depression was 2443/5893 (41.5%; 95% CI: 40.2–42.7).

According to the results of visometry, 377 people (6.4 %) showed visual impairment, of which 184 people had mild (3.1%; 95% CI: 2.7–3.6), 182 people had moderate and severe (3.1%; 95% CI: 2.7–3.5) and 11 people were blind (0.19%, 95% CI: 0.008–0.030).

Multivariate regression analysis revealed that the risk factors for depression are female gender ($p<0.001$), low level of education ($p=0.04$), less alcohol consumption ($p<0,001$), rare fruit consumption ($p<0.001$) and less salt consumption ($p=0.04$), and a history of frequent headaches ($p=0.001$), sore throat ($p=0.008$), pain in the thoracic spine ($p<0.001$), cerebrovascular diseases ($p=0.03$), skin diseases ($p=0.006$) and thyroid gland diseases ($p=0.02$), frequent falls ($p=0.003$), fainting ($p<0.001$), weak dynamometry ($p<0.001$), less physical activity ($p<0.001$), and hearing loss ($p<0.001$).

In addition, depression was associated with such ophthalmological parameters as dry eye syndrome ($p=0.001$) and low visual acuity ($p=0.02$) (*Table 1*).

On the other side, depression is also a risk factor for a number of ophthalmic and general somatic diseases and pathological conditions, such as dry eye syndrome (OR: 1.04; 95% CI: 1.01–1.07; $p=0.009$), hearing loss (OR: 1.06; 95% CI: 1.04–1.08; $p<0.001$), unintentional injuries and falls (OR: 1.05; 95% CI: 1.03–1.07; $p<0.001$), conditions associated with airway obstruction (OR: 1.08; 95% CI: 1.03–1.12; $p<0.001$) and asthma (OR: 1.08; 95% CI: 1.03–1.12; $p<0.001$) (*Table 2*).

DISCUSSION

In our study we have find the data that shows the present of a positive correlation between depression and DED. Our results are comparable to the results of the study Galor et al., they found a high positive correlation between these two conditions [11]. The association of depression with vision loss and DED is due not only to biological, but also behavioral factors. In patients with depression, there is a decrease in the frequency of blinking, an increase in the time spent using digital devices, and the influence of psychotropic drugs (especially antidepressants with an anticholinergic effect) is also possible, which contributes to the development or aggravation of DED [12, 13].

The relationship between depression and hearing impairment identified in this study is supported by data obtained in other epidemiological studies. Lawrence et al. observed that older people with hearing impairments are more likely to have depression than those with normal hearing [14]. Similar data were obtained by Wei et al., who noted that hearing loss increases the risk of developing depression [15]. Thus, the association of depression with hearing disorders is bidirectional. On the one hand, sensory deprivation and social isolation in hearing loss increase the risk of depression, and on the other hand, depression through vascular, inflammatory and neurodegenerative mechanisms can contribute to hearing loss. In an experimental study Rao et al. it was found that early sensorineural hearing loss disrupts the work of the auditory cortex and changes the serotonergic regulation of neurons, reducing the effectiveness of se-

Table 1

Factors associated with depression according to the Ural Eye and Medical Study (results of multivariate regression analysis)

Таблица 1

Факторы, ассоциированные с депрессией, по данным Ural Eye and Medical Study (результаты многофакторного регрессионного анализа)

Parameter Параметр	Regression coefficient β Коэффициент регрессии β	Regression coefficient B, 95% CI Коэффициент регрессии B, 95% ДИ	Significance level, p Уровень значимости, p
Gender (Male / Female) Пол (Мужчины / Женщины)	0.12	0.84 (0.50–1.18)	<0.001
Level of education Уровень образования	0.03	0.31 (0.02–0.57)	0.04
Alcohol consumption (yes/no) Употребление алкоголя (да/нет)	0.10	0.79 (0.54–1.04)	<0.001
Amount of fruits consumed per day (pieces) Количество фруктов, употребляемых в день (штук)	−0.06	−0.12 (−0.17– −0.06)	<0.001
Amount of salt consumed per day (grams) Количество соли, употребляемой в день (грамм)	−0.03	−0.05 (−0.10– −0.002)	0.04
History of frequent sore throat (no/yes) Частая ангина в анамнезе (нет/да)	0.04	0.54 (0.14–0.94)	0.008
Headaches (no/yes) Головные боли (нет/да)	0.06	0.41 (0.18–0.64)	0.001
Pain in the thoracic spine (no/yes) Боли в грудном отделе позвоночника (нет/да)	0.10	0.91 (0.64–1.19)	<0.001
Cerebrovascular disease, incl. stroke (no/yes) Цереброваскулярные заболевания, инсульт (нет/да)	0.03	0.29 (0.02–0.57)	0.03
Skin diseases (no/yes) Кожные заболевания (нет/да)	0.04	0.72 (0.21–1.23)	0.06
Thyroid disease (no/yes) Болезни щитовидной железы (нет/да)	0.04	0.49 (0.08–090)	0.02
Frequent falls (no/yes) Частые падения (нет/да)	0.05	0.47 (0.16–0.77)	0.003
Fainting (no/yes) Обмороки (нет/да)	0.08	1.08 (0.64–1.53)	<0.001
Dynamometry (decanewton) Динамометрия (деканьютон)	-0.11	-0.04 (-0.05– -0.02)	<0.001
Physical activity Физическая активность	-0.06	-0.43 (-0.65– -0.20)	<0.001
Dry eye syndrome (yes/no) ССГ (нет/да)	0.05	0.86 (0.03– 1.39)	0.001
Hearing Loss Scale Шкала снижения слуха	0.07	0.02 (0.01– 0.03)	<0.001
Visual acuity (Log MAR) Острота зрения (Log MAR)	0.04	0.82 (0.16– 1.48)	0.02

rotonin influence. Since serotonin plays a key role in mood regulation, such changes may contribute to an increased risk of developing depression [16, 17]. Also in the literature, there is evidence that hyperactivation of the hypothalamic-pituitary-adrenal axis (HPA-axis), characteristic of depression, is accompanied by a chronic increase in cortisol levels. This has a neurotoxic effect, contributes to the development of vascular disorders, and can aggravate both visual and auditory dysfunction [18].

As part of our study, it was found that depressive state is invariably associated with unintentional falls in older people. Similar results were presented in a study Lai et al., where

Table 2

Risk factors for ophthalmological and general somatic diseases and pathological conditions according to the Ural Eye and Medical Study

Таблица 2

Факторы риска офтальмологических и общесоматических заболеваний и патологических состояний по данным Ural Eye and Medical Study

Parameter Параметр	OR (95% CI) ОШ (95% ДИ)	Level p Уровень p
Risk factors for dry eye syndrome Факторы риска синдрома «сухого глаза»		
Old age Пожилой возраст	0.98 (0.97–1.00)	0.005
Male gender Мужской пол	2.04 (1.61–2.58)	<0.01
Accommodation in the city Проживание в городе	1.24 (1.01–1.54)	0.045
Depression Депрессия	1.04 (1.01–1.07)	0.006
Thyroid disease (yes/no) Болезни щитовидной железы (да/нет)	1.49 (1.12–1.99)	0.006
Risk factors for hearing loss Факторы риска снижения слуха		
Old age Пожилой возраст	1.06 (1.06–1.07)	<0.001
Male gender Мужской пол	1.26 (1.09–1.47)	<0.001
Depression Депрессия	1.06 (1.04–1.08)	<0.001
Headaches Головные боли	1.27 (1.10–1.47)	0.001
Cardiovascular diseases Сердечно-сосудистые заболевания	1.32 (1.13–1.55)	0.001
Osteoarthritis Остеоартрит	1.40 (1.18–1.67)	<0.001
Alcohol consumption Употребление алкоголя	1.51 (1.28–1.78)	<0.001
Physical activity Физическая активность	1.40 (1.21–1.62)	<0.001
Risk factors for unintentional falls and injuries Факторы риска неумышленных падений и травм		
Old age Пожилой возраст	1.01 (1.005–1.02)	<0.001
Accommodation in the city Проживание в городе	1.59 (1.37–1.85)	0.001
Smoking (packs per day) Курение (пачек в день)	1.01 (1.004–1.01)	0.001
Waist-to-hip ratio Индекс соотношения талии к бедрам	1.01 (1.002–1.01)	0.008
Arthritis Артрит	1.38 (1.18–1.62)	<0.001
Back pain Боли в спине	1.73 (1.49–2.02)	<0.001
Depression Депрессия	1.05 (1.03–1.07)	<0.001

Table 2. The End

Таблица 2. Окончание

Conditions associated with airway obstruction Состояния. сопровождающиеся обструкцией дыхательных путей		
Female Женский пол	1.42 (1.04–1.93)	0.03
Accommodation in the city Проживание в городе	1.43 (1.12–1.79)	0.003
Smoking (packs per day) Курение (пачек в день)	1.03 (1.02–1.08)	<0.001
Depression Депрессия	1.05 (1.02–1.08)	0.002
Cardiovascular Disease Сердечно-сосудистые заболевания	1.86 (1.45–2.39)	<0.001
Low Physical Activity Низкая физическая активность	0.71 (0.54–0.93)	0.01
Risk factors for asthma Факторы риска астмы		
Accommodation in the city Проживание в городе	1.43 (1.12–1.79)	0.003
Alcohol consumption Употребления алкоголя	0.53 (0.33–0.87)	0.01
Depression Депрессия	1.08 (1.03–1.12)	<0.001

it was found that falls in middle-aged and elderly adults increase the risk of depressive symptoms, especially in men, with pain acting as a partial mediator of this association. The development of depression was associated with the interaction of physiological (pain), psychological (fear, helplessness) and social factors (isolation, decreased activity), as well as side effects of drug therapy, including sedation and orthostatic hypotension [19, 20]. Injuries from falls can lead to functional limitations and loss of self-care, reducing the sense of control over life. Chronic pain causes neurobiological changes in the brain structures that regulate emotions, disrupting the balance of neuromediators such as serotonin and norepinephrine [21–23].

Inflammatory processes contribute to tissue damage, impaired neuronal transmission and the formation of concomitant symptoms, both from the respiratory system and the sensory organs. So, in the study of Jiang et al. it was determined that people with depression are 3.17 times more likely to have concomitant asthma than people without depression, and patients with asthma are 1.52 times more likely to have concomitant depression than those who do not suffer from it [24]. Depression and bronchial asthma have a relationship due to a violation of the balance of cytokines and the activation of inflammatory processes in the body. Elevated levels of pro-inflammatory cytokines such as IL-1, IL-6, and TNF-α can affect the nervous system and worsen depressive states, which in turn reduces asthma control. Another universal mechanism is oxidative stress, which is characterized by excessive formation of reactive oxygen species and a decrease in antioxidant protection. This process leads to damage to the cells of the retina, auditory system and airway epithelium, contributing to the progression of both sensory disorders and bronchial obstruction. Oxidative stress contributes to a shift in the immune response towards Th2-like activity, which can lead to allergic reactions and worsen asthma symptoms. So, the interaction between depression and asthma creates a vicious cycle, where each condition can make the other worse. In addition to general inflammatory mechanisms, neurovegetative disorders and behavioral factors such as smoking and low treatment adherence play an important role [25–28].

Thus, depression can be considered as a systemic multi-organ disorder, which is based on the interaction of immune, neuroendocrine and neurovegetative mechanisms. This determines the need for a comprehensive approach to the diagnosis and treatment of patients, taking into account somatic comorbidity, including the presence of eye diseases.

CONCLUSION

Along with some demographic and social parameters that determine the general state, health of the body and lifestyle characteristics, the presence of depression was independently associated with such general somatic diseases and conditions as hearing loss, unintentional injuries and falls, conditions accompanied by airway obstruction and asthma. The revealed correlation of depression with low visual acuity and dry eye syndrome suggests an association between eye diseases and the psychological state of patients and a decrease in their quality of life.

The obtained data emphasize that when carrying out diagnostic measures, as well as treating patients with eye diseases and general somatic diseases, it is necessary to pay attention not only to changes in ophthalmological, systemic, and laboratory parameters, but also to the psychological state of patients.

ЛИТЕРАТУРА/REFERENCES

1. GBD 2019 Diseases and Injuries Collaborators. Global burden of 369 diseases and injuries in 204 countries and territories, 1990-2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258): 1204–22. https://doi.org/10.1016/S0140-6736(20)30925-9
2. Craske MG, Stein MB. Anxiety. Focus (Am Psychiatr Publ). 2017;15(2): 199–210. https://doi.org/10.1176/appi.focus.15203
3. Медоева М.А., Абиева И.М. Связь нарушений зрения с депрессивными расстройствами. *Вестник науки.* 2023;2(1): 293–6.
   Medoeva MA, Abieva IM. Svyaz` narushenij zreniya s depressivny`mi rasstrojstvami. *Vestnik nauki,* 2023;2(1): 293–6. (In Russ.).
4. Friedrich MJ. Depression Is the Leading Cause of Disability Around the World. *JAMA.* 2017;317(15): 1517. https://doi.org/10.1001/jama.2017.3826
5. Miller AH, Raison CL. The role of inflammation in depression: from evolutionary imperative to modern treatment target. *Nat Rev Immunol.* 2016;16(1): 22–34. https://doi.org/10.1038/nri.2015.5
6. World Health Organization. The World Health Organization data from: depressive disorder (depression), 2023.
7. Беккер Р.А., Быков Ю.В. Депрессия в офтальмологии – причина и следствие глазных болезней (обзор литературы). *Психические расстройства в общей медицине.* 2016;3: 36–42.
   Bekker RA, Bykov YuV. Major depression in ophthalmology: a cause or a consequence of an ocular disease (a systematic review of foreign literature). *Mental Disorders in General Medicine.* 2016;3: 36–42. (In Russ.).
8. Bikbov MM, Kazakbaeva GM, Rakhimova EM, Rusakova IA, Fakhretdinova AA, Tuliakova AM, Panda-Jonas S, Gilmanshin TR, Zainullin RM, Bolshakova NI, Safiullina KR, Gizzatov AV, Ponomarev IP, Yakupova DF, Baymukhametov NE, Nikitin NA, Jonas JB. Prevalence Factors Associated With Vision Impairment and Blindness Among Individuals 85 Years and Older in Russia. *JAMA Netw Open.* 2021;4(8): e2121138. https://doi.org/10.1001/jamanetworkopen.2021.21138
9. Thomas JL, Jones GN, Scarinci IC, Mehan DJ, Brantley PJ. The utility of the CES-D as a depression screening measure among low-income women attending primary care clinics. The Center for Epidemiologic Studies-Depression. *Int J Psychiatry Med.* 2001;31(1): 25–40. https://doi.org/10.2190/FUFR-PK9F-6U10-JXRK
10. Lewinsohn PM, Seeley JR, Roberts RE, Allen NB. Center for Epidemiologic Studies Depression Scale (CES-D) as a screening instrument for depression among community-residing older adults. *Psychol Aging.* 1997;12(2): 277–87. https://doi.org/10.1037//0882-7974.12.2.277
11. Galor A, Feuer W, Lee DJ, et al, Depression, post-traumatic stress disorder, and dry eye syndrome: a study utilizing the national United States Veterans Affairs administrative database. *Am J Ophthalmol.* 2012;154(2): 340–6.e2. https://doi.org/10.1016/j.ajo.2012.02.009
12. van der Vaart R, Weaver MA, Lefebvre C, Davis RM. The association between dry eye disease and depression and anxiety in a large population-based study. *Am J Ophthalmol.* 2015;159(3): 470–4. https://doi.org/10.1016/j.ajo.2014.11.028
13. Liyue H, Chiang PP, Sung SC, Tong L. Dry Eye-Related Visual Blurring and Irritative Symptoms and Their Association with Depression and Anxiety in Eye Clinic Patients. *Curr Eye Res.* 2016;41(5): 590–9. https://doi.org/10.3109/02713683.2015.1056804
14. Lawrence BJ, Jayakody DMP, Bennett RJ, et al. Hearing Loss and Depression in Older Adults: A Systematic Review and Meta-analysis. *Gerontologist.* 2020;60(3): e137–e154. https://doi.org/10.1093/geront/gnz009
15. Wei J, Li Y, Gui X. Association of hearing loss and risk of depression: a systematic review and meta-analysis. *Front Neurol.* 2024;15: 1446262. https://doi.org/10.3389/fneur.2024.1446262
16. Dedeoglu S, Toprak SF, Sırma E, Dönmezdil S. When Sound Fades: Depression and Anxiety in Adults with Hearing Loss-A Cross-Sectional Study. *Healthcare (Basel).* 2025;13(24): 3320. https://doi.org/10.3390/healthcare13243320
17. Rao D, Basura GJ, Roche J, Daniels S, Mancilla JG, Manis PB. Hearing loss alters serotonergic modulation of intrinsic excitability in auditory cortex. *J Neurophysiol.* 2010;104(5): 2693–703. https://doi.org/10.1152/jn.01092.2009
18. Keller J, Gomez R, Williams G, et al. HPA axis in major depression: cortisol, clinical symptomatology and genetic variation predict cognition. *Mol Psychiatry.* 2017;22(4): 527–36. https://doi.org/10.1038/mp.2016.120
19. Lai X, Huang J, Xu T, et al. The Impact of Falls on Depressive Symptoms in Middle-Aged and Older Chinese Adults: Mediating Effects of Pain. *Psychol Res Behav Manag.* 2026;19: 569966. https://doi.org/10.2147/PRBM.S569966
20. Kvelde T, McVeigh C, Toson B, et al.. Depressive symptomatology as a risk factor for falls in older people: systematic review and meta-analysis. *J Am Geriatr Soc.* 2013;61(5): 694–706. https://doi.org/10.1111/jgs.12209
21. Chen T, Wang J, Wang YQ, Chu YX. Current Understanding of the Neural Circuitry in the Comorbidity of Chronic Pain and Anxiety. *Neural Plast.* 2022;2022: 4217593. https://doi.org/10.1155/2022/4217593
22. Song Q, Zhang Z, Liang Y. Neuroplasticity in the transition from acute to chronic pain. *Neurotherapeutics.* 2024;21(6): e00464. https://doi.org/10.1016/j.neurot.2024.e00464
23. Walker EF, Diforio D. Schizophrenia: a neural diathesis-stress model. *Psychol Rev.* 1997;104(4): 667–85. https://doi.org/10.1037/0033-295x.104.4.667
24. Jiang M, Qin P, Yang X. Comorbidity between depression and asthma via immune-inflammatory pathways: a meta-analysis. *J Affect Disord.* 2014;166: 22–9. https://doi.org/10.1016/j.jad.2014.04.027
25. Surve TAN, Sharma DD, Khan KG, et al. A comprehensive review of the intersection between asthma and depression. *J Asthma.* 2024;61(9): 895–904. https://doi.org/10.1080/02770903.2024.2324862
26. Gao YH, Zhao HS, Zhang FR, et al. The Relationship between Depression and Asthma: A Meta-Analysis of Prospective Studies. *PLoS One.* 2015;10(7): e0132424. https://doi.org/10.1371/journal.pone.0132424
27. Wang X, He J, Cabrera-Mendoza B, Qiu D, et al. Assessing the comorbidity between asthma and depression through polygenic risk scoring and time-to-event models. *BMC Med.* 2026;24(1): 101. https://doi.org/10.1186/s12916-026-04646-w
28. Ji T, Lv Y, Yang J, Diao X, Gu J. Association between depression and asthma: insight from observational and genetic evidence. *BMC Psychiatry.* 2025;25(1): 786. https://doi.org/10.1186/s12888-025-07245-w.

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