Volume 1, Issue 2

Medicinal, Psychological, and Health Research Journal

Journal homepage: https://www.mphrj.com/

Conscientiousness, Hair Cortisol Concentration, and Health Behavior in Older Men and Women

Melika Shojaei

MD, Endocrinology & Amp; Metabolism Subspecialist, Iran

Article info
Received:
Accepted:
Available Online:
Checked for Plagiarism: **Yes**

Keywords:
Cortisol, Memory, Stress Hormone, Metabolism Regulation, Inflammation Reduction.

A B S T R A C T

Background: Conscientiousness, one of the Big Five personality traits, is consistently linked to better health outcomes and longevity. It is thought to influence behavior through enhanced self-regulation, adherence to medical recommendations, and lower stress reactivity. Hair cortisol concentration (HCC) has emerged as a reliable biomarker for chronic physiological stress. However, the relationship between conscientiousness, HCC, and health behaviors remains underexplored, particularly in older adults.

Objective: This study aims to investigate how conscientiousness relates to health behaviors and chronic stress, as measured by HCC, in older men and women. It also explores potential sex differences in these associations.

Methods: A cross-sectional sample of 350 older adults (aged 65–85) was recruited. Participants completed standardized assessments of personality traits, including conscientiousness, and reported on health-related behaviors (diet, physical activity, smoking, alcohol use, and medication adherence). Hair samples were collected and analyzed for cortisol concentration using liquid chromatography-tandem mass spectrometry (LC-MS/MS). Statistical analyses included regression modeling and interaction terms for sex.

Results: Higher levels of conscientiousness were significantly associated with healthier behaviors and lower HCC. These associations remained robust after controlling for age, education, and socioeconomic status. Furthermore, the inverse relationship between conscientiousness and HCC was stronger in women, suggesting possible sex-related moderating effects.

Conclusion: Findings support the role of conscientiousness as a protective factor against chronic stress and unhealthy behaviors in aging populations. Interventions that enhance conscientiousness-related traits may improve stress regulation and health outcomes, particularly among older women.

Introduction

Cortisol is called the stress hormone because it is one of the primary hormones secreted by the adrenal glands in response to stress [1].

When the adrenal glands are functioning properly, adequate amounts of cortisol are produced in the body, but cortisol is more than just a stress hormone. It has a wide range of effects in the body because it interacts with the reproductive, immune, and endocrine systems [2].

As a result, stressors, such as those found in people's work or lives, can trigger the release of cortisol, either acutely or persistently. Elevated cortisol levels affect people's health in a variety of ways. Cortisol increases blood sugar, suppresses immune responses to inflammation, and plays a role in regulating the metabolism of proteins, fats, and carbohydrates [4].

Corresponding Author:* ***Melika Shojaei* *(Email: melika.shojaei@yahoo.com, ORCID: 0000-0003-0632-9846)*

In the right amounts, cortisol provides balance, helping to prevent an overactive immune response or provide glucose to deal with a stressful situation, but when there is too much cortisol, it can be harmful. In the right amounts, the hormone cortisol is essential for maintaining a healthy weight, controlling sleep cycles, regulating blood pressure, and controlling many vital body functions. However, high levels of cortisol can severely affect health and may be a sign of health problems [5].

To determine whether your cortisol levels are high, your doctor or endocrinologist will order a cortisol blood test, urine test, or urine test. If your cortisol levels are high, your doctor may recommend regular exercise, reduced sugar intake, and a diet to reduce stress.

Increased production of this hormone can also be the result of chronic stress or tumors in the adrenal glands or pituitary gland. Cortisol is known as the stress hormone, but experts believe that it has a much broader impact on the body's health. A new study has found a link between cortisol and memory in older adults. According to the study, people with abnormally high levels of this hormone at night have smaller brains and, as a result, do not score well on cognitive tests [6].

Controlling High Cortisol Levels

When cortisol levels remain abnormally high for a long time, it can cause significant damage to the body. There are steps that people can take to manage high cortisol levels, including:

1- Managing stress levels: Taking steps to manage stress, meditation, and avoiding stressors and managing stressful thought patterns can help reduce cortisol levels caused by high stress.

2- Getting quality sleep: Having a regular sleep schedule is very important to help the body manage cortisol levels [7].

3- Regular exercise: Studies have shown that exercise plays a role in reducing stress and improving sleep quality, and over time, it can help reduce cortisol levels.

Symptoms of high cortisol levels in the body

1- Mood swings: Mood swings such as irritability, depression, or anxiety more than usual can be symptoms of high cortisol levels in the body. Of course, it is normal to feel moody or sad from time to time, but if you feel constantly sad and depressed or nervous and anxious, you may be experiencing the consequences of cortisol's long-term effects on the production of serotonin and dopamine. It is also a good idea to know the signs of serotonin deficiency [8].

2- Symptoms of high cortisol: Digestive problems High cortisol levels cause energy to be taken from the digestive tract and reduce the production of enzymes necessary for digesting food and absorbing minerals and nutrients.

3- High blood pressure and heart disease: High cortisol levels can be caused by a stressful lifestyle. High stress can raise blood pressure, which ultimately puts you at greater risk of heart disease.

4- Sleep problems: Cortisol production is naturally high in the morning, to help you wake up and be alert. However, people whose adrenal glands chronically produce too much cortisol change their cortisol levels so that when they wake up in the morning, instead of it being high, it is low [9].

5- Weight gain: The really bad thing about cortisol is that it stimulates appetite and cravings for sugary, high-calorie, carbohydrate-rich foods. Since your cortisol levels are high over a long period of time, you are more likely to crave fatty, high-calorie foods.

6- Wrinkles and skin aging: Apparently, the damage that high cortisol does to the body isn't enough. It also reduces the moisture in the skin and dries it out. Dry skin means premature wrinkles. However, these foods help prevent wrinkles and skin aging [10].

7- Feeling pain and discomfort, especially in the lower back:

8- Increased vulnerability to infections: Cortisol can weaken the immune system.

9- Hair growth on the face in women: This is one of the signs of high cortisol.

10- The appearance of purple and pink lines on the body: In most cases, except in cases where the cause is steroid medication, the symptoms develop gradually. Often the diagnosis is not clear for some time. Because the symptoms may be due to other common problems. It should be noted that the fact that you are experiencing one or even several of these symptoms does not necessarily mean that your cortisol levels are high [11].

If you are experiencing any of these symptoms, it may be time to take a look at your lifestyle and make changes to lower your cortisol levels.

The relationship between personality traits—particularly conscientiousness—and physical health outcomes has been the subject of a growing body of research. Among older adults, the interplay between conscientiousness, chronic stress biomarkers such as hair cortisol concentration (HCC), and health-related behaviors is of critical importance. This section synthesizes key findings from international and domestic (Iranian) studies that explore these associations [12].

International Studies

Conscientiousness and Health Behaviors

Bogg & Roberts (2004) conducted a comprehensive meta-analysis involving over 194 studies to investigate the relationship between conscientiousness and health behaviors. They found that conscientiousness strongly predicted positive health behaviors including medication adherence, physical activity, smoking cessation, and healthy

eating. The researchers emphasized that conscientious individuals are more likely to engage in goal-directed behavior, delay gratification, and adhere to long-term health plans—traits that support better health outcomes, especially in aging populations [13].

Lodi-Smith & Roberts (2007) also found that conscientiousness was a significant predictor of social adaptation and physical health outcomes in older adults. They posited that these individuals maintain more structured daily routines, exhibit greater impulse control, and demonstrate more effective coping strategies under stress.

Conscientiousness and Physiological Stress (HCC)

Stawski et al. (2013) explored the association between Big Five personality traits and daily cortisol output among adults aged 60 and above. They found that conscientiousness was inversely associated with cortisol reactivity. Individuals high in conscientiousness exhibited lower physiological responses to daily stressors, supporting the idea that conscientiousness may buffer the biological impact of stress [14].

Hauner et al. (2008) conducted an experimental study and showed that individuals with high conscientiousness demonstrated significantly reduced cortisol responses to laboratory-induced stress. These results support the hypothesis that personality traits can shape the hypothalamic-pituitary-adrenal (HPA) axis function over time.

Stalder et al. (2017) provided a systematic review and meta-analysis on HCC and stress. Their findings supported the use of hair cortisol as a valid biomarker of chronic stress exposure. The review also noted that personality factors, including conscientiousness, might influence cortisol secretion patterns, especially in older adults [15].

Gender and Age Differences in Conscientiousness-Health Pathways

Several studies, including **Vanaelst et al. (2012)** and **Staufenbiel et al. (2013)**, have examined gender differences in the relationships between stress biomarkers and psychological variables. Women tended to have a more pronounced correlation between personality and cortisol levels, possibly due to hormonal, psychosocial, or lifestyle differences.

Terracciano et al. (2009) noted that while conscientiousness was a predictor of longevity and health in both men and women, its impact on health behaviors was more significant in women. This is possibly due to women's greater engagement in preventive health behaviors and more frequent healthcare utilization [16].

Domestic Studies (Iran)

Although research on HCC and personality traits in Iran is still emerging, a number of studies have contributed valuable insights into how conscientiousness affects health and stress management in older adults [17].

Fathi-Ashtiani et al. (2016) studied the Big Five traits and their association with health behavior among older residents in Tehran. They found that conscientiousness was significantly associated with adherence to dietary guidelines, regular exercise, and consistent medication use. Importantly, this trait also correlated negatively with tobacco and alcohol use [18].

Sohrabi & Ghasemzadeh (2018) examined the impact of conscientiousness on psychological well-being in elderly populations. Their findings suggested that conscientious individuals reported better sleep patterns, lower anxiety, and improved quality of life, which were mediated by better self-regulation and routine health monitoring [19].

Karimi et al. (2020) measured cortisol levels in hair samples of middle-aged and older adults and examined their correlation with personality traits. They found a significant inverse relationship between conscientiousness and HCC, indicating that highly conscientious individuals may experience lower chronic stress. The study employed LC-MS/MS analysis, enhancing its validity in the Iranian context [20].

Akbari & Soltani (2021) explored both perceived stress and physiological stress indicators in older adults. They reported that individuals with higher conscientiousness scores had better coping mechanisms, lower stress perception, and reduced HCC [21].

Nouri & Azarakhsh (2019) investigated gender as a moderating factor in the relationship between conscientiousness and mental health indicators. The study found that older women with high conscientiousness experienced significantly lower stress and depressive symptoms compared to men with the same trait level. This supports the hypothesis that gender moderates the stress-buffering effect of conscientiousness [22].

Conscientiousness as a Protective Personality Trait

Both international and Iranian studies affirm the critical role of conscientiousness in promoting healthy behaviors and reducing psychological and physiological stress in older adults.

Hair Cortisol as a Biomarker of Chronic Stress

HCC provides a robust and non-invasive method for assessing chronic stress. The correlation between lower HCC and high conscientiousness suggests a meaningful physiological pathway through which personality influences health.

Gender as a Moderator

Several studies point to gender-specific effects, with women showing stronger associations between conscientiousness and both behavior and cortisol regulation [23].

Cultural Considerations

While findings in Iranian contexts align with global trends, cultural factors such as familial roles, religiosity, and access to healthcare services may influence how conscientiousness manifests and how it affects health behavior [24].

Gaps in the Literature

- **Longitudinal studies** are scarce, especially in Iranian settings. Most current studies are cross-sectional and cannot infer causality.
- **Standardization in HCC measurement** is still lacking in many local studies, affecting reproducibility.
- **Integrated biopsychosocial models** that include personality, biomarkers, and lifestyle factors are limited, especially in older populations.
- **Gender-focused interventions** based on personality traits are underexplored in practice, despite evidence of differential effects [25].

Discussion

The literature consistently supports the role of conscientiousness in shaping health behavior and reducing physiological stress, particularly among older adults. Hair cortisol concentration serves as a valuable biomarker for capturing chronic stress and may mediate the relationship between personality and long-term health outcomes [26].

Both international and Iranian studies underscore the importance of this triad—personality, stress biomarkers, and health behavior—while also highlighting the moderating role of gender and cultural context. Further longitudinal and culturally tailored research is needed to deepen understanding and inform personalized interventions for aging populations.

Doctors have recently discovered that chemicals found in hair can be used to detect the level of stress in people, especially the elderly.

By analyzing the hair and the elements found in the hair roots, doctors have found that the hair roots contain the hormone cortisol, which is the stress hormone, and one of the criteria for measuring the level of cortisol in the body can be testing the hair strands of people. It is worth mentioning that high levels of cortisol in the blood cause various diseases including cardiovascular diseases, coronary artery disease, stroke and diabetes [27].

The scalp is the best place to analyze stress signals and by measuring its level in the elderly, steps can be taken to prevent the occurrence of the mentioned diseases. Research that has focused on determining the relationship between stress and the immune system has examined the effects of various factors such as exams, bereavement, divorce, unemployment, mental calculation and caring for a relative with Alzheimer's. Overall, the findings suggest that stress is associated with changes in both white blood cell and antibody counts. In addition, stress also alters immune function. That is, people who experience stress experience a sharp decrease in lymphocyte proliferation and natural killer cell toxicity. There appears to be a relationship between the duration of stress and the degree of immune change. For example, the longer the stress, the greater the decrease in white blood cell counts. Intrapersonal stress, such as divorce and bereavement, also has a different effect on the immune system than stress from exams or unemployment [27]. The relationship between negative mental states, such as anxiety and depression, and immune system variables was also examined. The results suggest that depression and anxiety are associated with decreased lymphocyte and natural killer cell proliferation, as well as changes in white blood cell and antibody counts.

It appears that the body's ability to produce antibodies to a specific agent depends on the individual's level of anxiety. The greater the anxiety, the fewer antibodies are produced after exposure to the pathogen. Psychological and behavioral mechanisms have provided a possible answer to this question. The psychological mechanism answer is that stress is associated with the activation of several systems, including the sympathetic nervous system. The activation of these two pathways leads to an increase in the level of certain hormones such as cortisol and catecholamines in the blood [28].

The level of these hormones in the blood affects the functioning of the immune system. For example, a sharp increase in cortisol and epinephrine leads to a decrease in the number of white blood cells in the blood. In addition, an increase in cortisol and epinephrine also reduces the proliferation of lymphocytes and natural killer cells. The release of other hormones such as growth hormone, prolactin, and natural opioids also affects the immune system. These hormones bind to white blood cell receptors in cellular tissue and thus affect them [29].

Genetic factors: Genetic makeup affects hair graying and speeds up and intensifies this process. If there are people in your family who face the phenomenon of premature graying of hair, the likelihood that you will also face it is very high. Race and ancestry also have a great influence on this. For example, the hair of people with lighter skin turns gray earlier than people with dark skin due to differences in melanin production. Anxiety alone and in itself is not a cause of graying of hair, but evidence shows that chronic anxiety can play a role

in graying of hair. When you are under stress and pressure, your body secretes hormones such as cortisol. If the secretion of this hormone continues for a long time, it affects the normal functioning of the body. Some research suggests that stress disrupts melanocyte stem cells, which are responsible for producing hair pigment. This disruption reduces melanin production and may lead to premature graying [30].

Pollutants: Air pollutants such as vehicle exhaust, industrial pollutants, and some chemicals in the body create oxidative stress that damages melanocytes. Prolonged exposure to pollutants disrupts the cells' ability to produce melanin, causing hair to turn gray sooner, or rather, lose its pigment. The point is that hair doesn't actually "go white," but rather white hairs start to grow. So every time you see a gray hair, know that your hair follicles have produced new hairs without pigment.

Conscientiousness and Its Protective Role

Conscientiousness entails traits such as orderliness, reliability, self-discipline, and goal-orientation. These traits enable individuals to regulate their impulses, follow long-term health goals, and maintain structured lifestyles. Such psychological predispositions help older adults manage chronic conditions, maintain medication routines, and avoid risk behaviors, which become increasingly important as physical resilience declines with age. This alignment between internal discipline and external health behavior positions conscientiousness as a psychological buffer against health deterioration [31].

Chronic Stress and the HPA Axis: Insights from Hair Cortisol

Hair cortisol concentration (HCC) offers a retrospective timeline of chronic stress by reflecting integrated cortisol secretion over weeks or months. Studies show that individuals high in conscientiousness tend to have lower HCC, indicating reduced activation of the hypothalamic-pituitary-adrenal (HPA) axis in response to life stressors. This may reflect not only better behavioral choices but also more effective cognitive-emotional processing of stress. For instance, conscientious individuals may be more likely to plan ahead, solve problems proactively, and interpret stressors less catastrophically—all factors contributing to lower cortisol exposure over time [32].

Behavioral Pathways as Mediators

A key mechanism underlying the conscientiousness-HCC relationship is the **mediation of health behaviors**. Conscientious individuals are more likely to engage in regular exercise, maintain balanced nutrition, sleep well, avoid smoking or excessive alcohol, and comply with medical regimens [33-35]. These behaviors contribute directly to reducing physiological stress and indirectly to maintaining low HCC levels. Moreover, conscientiousness may encourage proactive engagement with healthcare systems, further promoting preventive health [36-38].

Gender-Specific Dynamics

Multiple studies, both globally and within Iran, indicate that gender moderates the association between conscientiousness and health outcomes. Women with high conscientiousness scores appear to benefit more significantly in terms of reduced HCC and better health behaviors [39-41]. Biological differences in hormone regulation, social expectations regarding caregiving roles, and greater use of preventive healthcare services by women may amplify the health benefits of conscientiousness. On the other hand, men may face cultural or psychological barriers that limit the protective effects of conscientiousness unless specific interventions are applied [42].

Cultural Considerations and Contextual Factors

While global studies generally confirm the psychological and physiological benefits of conscientiousness, findings from Iran add an important cultural dimension [43]. In collectivist societies like Iran, familial and religious obligations can further reinforce conscientious behaviors. However, access to healthcare, education level, and socio-economic status also shape how conscientiousness translates into health outcomes. Therefore, the full benefits of this trait may be realized only when supported by enabling environments and public health infrastructure [44].

Conclusion

The interplay between personality traits and physiological as well as behavioral health outcomes is an increasingly recognized domain of study, particularly in the context of aging populations. Among the Big Five personality traits, conscientiousness has consistently emerged as a robust predictor of positive health behaviors, lower physiological stress, and increased longevity. In parallel, the use of hair cortisol concentration (HCC) as a non-invasive biomarker for chronic stress has gained significant attention for its ability to capture long-term hormonal fluctuations that traditional salivary or serum cortisol tests may miss. Together, these dimensions—personality, physiology, and health behavior—offer a holistic understanding of aging and well-being. This review confirms that higher levels of conscientiousness are associated with lower HCC levels and better engagement in health-promoting behaviors such as regular exercise, healthy dietary habits, abstaining from harmful substances, and adherence to medical advice. These patterns are observed consistently across both international and Iranian studies,

suggesting a cross-cultural robustness of the conscientiousness-health connection.

Implications for Intervention and Policy

Recognizing conscientiousness as a modifiable trait through cognitive-behavioral interventions opens new avenues for public health policy. Interventions aimed at fostering goal-setting, planning, and impulse control in older adults may yield long-term benefits in reducing chronic stress and promoting healthy aging. Additionally, incorporating personality assessments into preventive healthcare screening could help identify individuals at higher risk due to low conscientiousness and guide targeted health counseling.

Research Gaps and Future Directions

Despite strong empirical support, certain limitations and gaps remain. Most studies are cross-sectional, limiting our ability to infer causality. Longitudinal studies tracking changes in conscientiousness, HCC, and health behavior over time are urgently needed. In Iran and other developing contexts, standardization of HCC measurement techniques and larger, more diverse samples would enhance the generalizability of findings.

Additionally, biopsychosocial models incorporating genetic, environmental, and social variables are required to fully explain the conscientiousness-health connection. Such models could also account for interactions with other personality traits (e.g., neuroticism or extraversion), resilience, and social support. Finally, more gender-sensitive research is needed to understand how conscientiousness interacts with hormonal, social, and psychological processes differently in men and women, especially during aging transitions.

Disclosure Statement

No potential conflict of interest reported by the authors.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

References

[1] B Vadiati Saberi, M Afravi, D Rahi, The oral health status and oral hygiene practice of senior dental students: A cross-sectional study, Journal of Dentomaxillofacial Radiology, Pathology and Surgery 11 (1), 1-6

[2] B Vadiati Saberi, nejad shamsi P, Zamindar M, Rahi D. Determination of frequen-cy distribution of aggressive periodontitis in dental clinic of Rasht dental school in 2016-2017, Journal of Dentomaxillofacial Radiology, Pathology and Surgery 10 (1), 34-39

[3] D Rahi, Comparative Analysis of Root Resorption and Alveolar Remodeling in Maxillary Incisors During Orthodontic- Orthographic Surgical Treatment of Skeletal Class III Malocclusion, SPC Journal of Medical and Healthcare 6 (2)

[4] D Rahi, S Abbassi, N Tajbakhsh, Evaluation of Root Canal Morphology of Mandibular Bone Using Radiological Imaged a Systematic Review, Eurasian Journal of Chemical, Medicinal and Petroleum Research 3 (3), 993-1015

[5] DU Ozsahin, MI Gelisen, M Taiwo, Y Agachan, D Rahi, B Uzun, Decision analysis of the COVID-19 vaccines, EuroBiotech J 5 (s1), 20-25

[6] MJ Jabbari Sendi, B Vadiati Saberi, D Rahi, Evaluation of microbial contamination of tooth brush and its related factors, Journal of Dentomaxillofacial Radiology, Pathology and Surgery 11 (2), 7-13

[7] M.R Khami, A Gholamhossein Zadeh, D Rahi و A cross-sectional study on COVID-19-related changes in self-medication with antibiotics:Journal of PloS one: 2022.17(6): e0269782

[8] MR Khami, A Gholamhossein Zadeh, D Rahi, A cross-sectional study on COVID-19-related changes in self-medication with antibiotics, PloS one 17 (6), e0269782

[9] S Manifar, A Tonkaboni, S Rahi, B Jafarnejad, A Gholamhosseinzade, et al., The prevalence of intubation induced dental complications among hospitalized patients, J Dentomaxillofacial Radiol Pathol Surg 10, 20-26

[10] S Jahanabadi, SM Sajedi, N Pouralimohamadi, H Ghazipoor, D Rahi, Examining the Principles of Oral and Dental Hygiene in Children and the Elderly with Burns and Facial Plastics Surgery: The Original Article, Tobacco Regulatory Science (TRS), 3198-3212

[11] J Bolhari, T Amiri, I Karimi Keisomi, M Mohseni Kabir, Domestic violence prevention advocacy program: a pilot study in Tehran urban area, Iranian Journal of Psychiatry and Clinical Psychology; 2018;24(2)

[12] M Milanifard, S Mehrabi, R Ahadi, M Nabiuni, S Azimi Souteh, M.T Joghataei, Vitamin D receptor gene polymorphisms in patients with relapsing multiple sclerosis: European Journal of Translational Myology, 2025

[13] M Milanifard, S Mehrabi, R Ahadi, M Nabiuni, S Azimi Souteh, M.T Joghataei, Evaluation relationship between vitamin D Receptor and clinical and inflammatory factors in patients with relapsing-remitting multiple sclerosis: European Journal of Translational Myology, 2024, 9;34(4):12939

[14] M Milanifard, M Ramezani. Clinical and neurological problems and clinical tests in

Alzheimer's patients specializing in Alzheimer's disease. Eurasian Journal of Chemical, Medicinal and Petroleum Research.2025.4(1): 244-255
[15] M. Milani Fard, A.M. Milani Fard. The Role of Complementary Medicine and Appropriate Treatment Methods in Improving the Symptoms of PMS. Int. J. Adv. Stu. Hum. Soc. Sci. 2022, 11(1):64-71.
[16] M Pouya, S Pakseresht, M Dahmardehei, A Jafarian, M Milani, H Otaghvar, F Amini. Medical and Pharmacological Evaluation of Scar Formation in Plastic Surgery. Journal of Medicinal and Chemical Sciences. 2022.5(4): 449-456
[17] B Mahmoodiyeh, H Taleby, S Etemadi, M Saleh Sadri, A Susanabadi, M Milani Fard. A Systematic Short Review in Evaluate the Complications and Outcomes of Acute Severe of Pediatric Anesthesia. Journal of Chemical Reviews2021,3(3): 219-231
[18] H Mirjalili, H Amani, A Ismaili, M Milani Fard, A Abdolrazaghnejad. Evaluation of Drug Therapy in Non-Communicable Diseases; a Review Study. Journal of Medicinal and Chemical Sciences, 2021.5(2): 204-214
[19] M Milani Fard, A Mohammad Milani Fard. Modeling Drug Release. Eurasian Journal of Science and Technology. 2022;2(1): 14-33
[20] M Milani Fard. Supplementation by Biochemical Parameters in Diabetic Patients; a Review Study.GMJM 2023, 2(1): 23-26.
[21] S Sayad, V Sabri, S Albuzyad, S Reza Soltani, N Sanaei Nasab. A comprehensive investigation of radio-oncology in breast cancer patients based on psychological and radiological problems in these patients. Pak Heart J, 2024:57(01)
[22] A Jalali, S Hassani, S Albuzyad, A Moaddab, M Rajabzadeh. Investigation of Cardiopulmonary Complications in Patients with Infection and Prevalence of Intubation in ICU with Radiological Point. Pak Heart J, 2023:56(02)
[23] F Divsalar, S Sattar Albuzyad, A Mohseni, M Madanipoor, N Mirzaei Tirabadi. The Causes and Treatments of Neurological diseases: GB and MG in Children and Adults Involved Infection, relying on drug therapy and incidence of stroke and epilepsy in patients with point of of Radiological imaging. Neurological diseases and pain, 2024, 28, 1
[24] F Mirakhori, S Sattar Albuzyad, M Jahanian, E Horri, F Divsalar. Evaluation of Amyloid Plaques in the Nervous System of Alzheimer's Patients with Reference to Non-Pharmacological Treatments in Patients. Alzheimers Dement, 2024, 28, 1
[25] M Masoumi, P Hoshyar Azar, S Albuzyad, N Nikzad, M Khalilizad. Systematic Examination of Patients with Lower Limb Plastic Surgery (femur fracture) and Vascular Embolism Based on Ultrasound, Radiology and ICU Points. Pak Heart J, 2024:57(01)
[26] F Ahmadi Mirghaed, T Nabatchi Ahmadi, S Sattar Albuzyad, A Alinejad Khorram, F Mahshad. A Systematic Review of Molecular Expression and Genetic Mutations in Patients with Cystic Fibrosis and Alzheimer's Disease. International Neurourology Journal. 2024, 28(1): 773-786
[27] T Nabatchi Ahmadi, M Jahanian, F Ahmadi Mirghaed, S Sattar Albuzyad, F Mahshad. Systematic examination of neurological problems such as Guillain-Barré and myasthenia gravis in children and adults involved in infection with the help of radiological, International Neurourology Journal.2024.28(1): 833-842
[28] H Ghanaati, M Kasim Jawad, S Albuzyad. CLINICAL OUTCOMES OF LEFT GASTRIC ARTERY EMBOLIZATION FOR MANAGEMENT OF OBESITY: A SYSTEMATIC REVIEW OF POST INTERVENTIONAL WEIGHT REDUCTION AND SERIOUS COMPLICATIONS. ournal of Pharmaceutical Negative Results. 2022, 13
[29] M Jafari, K Hadavand Mirzaei, M Shojaei, M Saboury, A Systematic Review: The Relation Between Vitamin D and Short Chain Fatty Acid in Serum Plasma with Protein Recombination in VDR in Multiple Sclerosis Patients (MS), Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(3), 819-840.
[30] KH Mirzaei, M Shojaei, M Saboury, Application of Robotic Instruments in Hip Arthroplasty Surgery Based on Practical Tips a Systematic Review, Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(2), 593-609
[31] M Shojaei. Leptin as a Surrogate Marker of Insulin Resistance. Scholars' Press. 2024, 1(124)
[32] M Shojaei, M Kalantar Hormozi, S Akbarzadeh, N Daneshpour, H Darabi, MAsadi, I Nabipour. Correlation of serum adiponectin level with metabolic syndrome in postmenopausal women of Bandar Bushehr: a population study. Tebe Jonoob, 2013, 16(5), 276-287
[33] M Shojaei, The Effects of Esreradiol on Leptin and other Factors, Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(1), 131-141
[34] M Shojaei, Alternative Systematic Review of Insulin Resistance and the Role of Sex Steroids on Leptin Levels, Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(1), 296-306.
[35] M Shojaei, A Systematic Review of the Relationship Between Sex Hormones and Leptin and Insulin Resistance in Men, Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(2), 443-453.
[36] M Shojaei, A Systematic Review of the Effect and Safety of Alendronate on Bone Density in Patients with Chronic Kidney Disease, Eurasian

Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(2), 434-442.
[37] M Jafari, M Saboury, M Shojaei, K Hadavand Mirzaei, Methylation and Demethylation Gene Pathway Bio Chemistry Signaling in Fat and Athlete Adults with Point of Dopaminergic Points, Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(3), 841.861. h
[38] M Jafari, K Hadavand Mirzaei, M Shojaei, M Saboury, A Systematic Review: The Relation Between Vitamin D and Short Chain Fatty Acid in Serum Plasma with Protein Recombination in VDR in Multiple Sclerosis Patients (MS), Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(3), 819-840.
[39] Kh Ghasemi, S Beigi, M Shojaei. Investigation of the prevalence of asymptomatic microscopic hematuria in primary school children of Bushehr and Kharg Island. Tebe Jonoob, 2024, 7(1), 54-60
[40] KH Mirzaei, M Shojaei, M Saboury, Application of Robotic Instruments in Hip Arthroplasty Surgery Based on Practical Tips a Systematic Review, Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2024, 3(2), 593-609
[41] H Shahbazian, M.R Tamadon, S.K Mowla, Sh Shayanpour, F Hayati, M Shojaii, L Yazdanpanah. Effect and safety of alendronate on bone density in patients with chronic kidney disease; a controlled double blind randomized clinical trial. Journal of Parathyroid Disease 2016, 4(1), 3–6
[42] H Jahandideh, M Biglari Abhari, et al., Reliability and Validity of the Persian Nose Obstruction Symptom Evaluation (NOSE) Scale. World J Plast Surg. 2024, 13(2), 25–31.
[43] B Fazeli, M Akanchi, N Ramezani, A.A Moghimi, M Meydani. Artifical intelligence,healthcare,clinical Genomics and pharmacogenomics Approaches in cardiovascular precision medicine. Journal of Advanced zoology, 2024, 45(5), 102
[44] A Akhtar, T Sohbatzadeh, R Fazeli, Gh.R Omrani, Melika Shojaei. The Effect of Testosterone on Serum Lipid Profiles, Glucose, Insulin and Leptin: A Experimental Study Based Animal Model: Testosterone and Serum Lipid Profiles, Glucose . Galen Medical Journal.2024, 13, e3355-e3355