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Estimation of Some Biochemical Parameters of Elderly Women

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Abstract:
This paper aims to find adiponectin, leptin, inflammatory markers (IL-6, CRP, and TNF-α), calcium, and vitamin (D) in (healthy-looking) older people. This study recruited 82 healthy women between the ages of 68 and 90 who volunteered to participate between July 2020 and December 2021. Excluded were patients with acute cardiac failure, autoimmune illness, infectious disease, malignancy, and liver dysfunction. A total of 60 healthy females, ages 22 to 38, made up the control group. The elderly women showed considerably greater levels of leptin, tumor necrosis factor-alpha, interleukin-6, and CRP in contrast to the control group, while their levels of adiponectin had significantly decreased. Vitamin D and calcium rates were also drastically reduced among the elder women than in females who were used as a comparison group. For this study, researchers examined the role of inflammatory mediators as biomarkers for frailty detection in older persons, focusing on the influence of ageing on pro/anti-inflammatory adipokines. The concentration of these indicators in adults and the elderly was therefore compared to achieve this goal.

Keywords: Leptin, Tumor necrosis factor (TNF-α), Interleukin 6 (IL-6), Diponectin, C-reactive protein (CRP).

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تقدير بعض المتغيرات الكيموحيوية لدى النساء كبار السن

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الملخص
يهدف البحث تقدير الاديبونكتين ولبتين ومؤشرات الالتهاب منها انترلوكين 6، عامل نخر الورم وبروتين سي التفاعلي والكالسيوم مع فتامين دي في نساء سليمات كبار في السن في هذه الدراسة اخذت 82 ل امراة سليمة خالية من الامراض تراوحت اعمارهم (68-90) سنة ما بين شهر

تموز 2020 الى شهر كانون الاول 2021 استبعدت النساء المصابات بفشل القلب، الأمراض المعدية، الأورام الخبيثة وخلل بالكبد .قورنت مع 60 امرأة سليمة بعمر 38-22.
أظهرت النساء المسنات مستويات أعلى بكثير من هرمون الليبتين، وعامل نخر الورم ألفا، والإنترلوكين 6، والبروتين المتفاعل C على عكس المجموعة الضابطة، في حين انخفضت مستويات الأديبونيكتين لديهم بشكل ملحوظ. كما انخفضت معدلات فيتامين د والكالسيوم بشكل كبير بين النساء الأكبر سناً مقارنة بالإناث اللاتي تم استخدامهن كمجموعة مقارنة. في هذه الدراسة، قام الباحثون بفحص دور وسطاء الالتهابات كمؤشرات حيوية للكشف عن الضعف لدى كبار السن، مع التركيز على تأثير الشيخوخة على الأديبوكينات المؤيدة والمضادة للالتهابات. ولذلك تمت مقارنة تركيز هذه المؤشرات لدى البالغين وكبار السن لتحقيق هذا الهدف.

الكلمات المفتاحية: اللبتين، عامل نخر الورم ألفا، انترلوكين 6، بروتين سي التفاعلي

Introduction

Physical resistance to environmental variables weakens along with decreased physiological activity, stress tolerance, adaptability, and reaction to environmental variables. These are all connected to changes in the hormones, metabolism, and chemical composition that occur naturally as we age. (1). The central nervous system deteriorates, resulting in a decrease in mental abilities such as memory and learning, as well as an increase in illness susceptibility. (2). Continual inflammation at a low level is a side effect of this, as are higher levels of inflammatory markers in the blood. (3). Heart disease, diabetes, and cancer are just some of the diseases that are linked to getting older and are frequently connected with a heightened presence of inflammatory markers. (4). Cytokines are among the most important mediators of inflammation. Several types of cells release these tiny proteins, which can either boost or slow down immune responses.

The composition and function of adipose tissue are altered by ageing, leading to insulin resistance and ectopic fat storage. The function and distribution of adipose tissue with ageing affect the release of adipokines, hormones secreted from fat cells that govern numerous physiologic processes, such as inflammation. (5). The propensity of adipose tissue to secrete many inflammatory cytokines such as IL-6, CRP, TNF, and adipokines (6). inflammatory cytokin causes arterial hypertension, resistance to insulin, and dyslipidemia (7).

The lipid hormones leptin and adiponectin are mostly generated in white adipose tissue. Through their pro- and anti-inflammatory activities, they contribute to chronic low-level inflammation, metabolic balance, and cancer progression. (5,8).

Adiponectin was discovered to have anti-inflammatory and cardiovascular protective properties, as well as a protective effect against insulin resistance. It prevents the process of NF-κB, activation, which limits the formation of cytokines that cause inflammation, such as IL-6, IL-18, and TNF-α (9).

Many illnesses, including cardiovascular disease and diabetes, are independently predicted by serum leptin levels (10). Recent Studies have revealed that older persons with elevated serum leptin levels, particularly middle-aged women, are more prone to have a decrease. in physical function as they age. (11, 12).

An increasing number of elderly people are suffering from vitamin D insufficiency, which has a substantial impact on their health. Vitamin D deficiency in older people may cause numerous health issues, including osteomalacia and arthritis, heart disease hip fractures, muscle weakness, diabetes, and osteoporosis (13,14,15).

Material and methods

Materials and Procedures:

The study comprised 82 female participants who were in good health, an age range of 67 to 88 years (age on average, 77.5). Samples were gathered between April 2021 and March 2022. None of the participants had any chronic medical conditions (including diabetes) in their medical history, and none of them were taking any medication during the trial. Women ages 22 to 38 were included in the control group.

All women and controls had five millilitres (blood drawn), and the serum was taken in a centrifuge at the range of 4000 rpm for a period of 15 minutes prior to storage at -20 degrees Celsius for analysis.

Methods:

Measurements were taken of the amount of (leptin, adiponectin, TNF, IL -6, and vitamin D3). An enzyme immunoassay kit based on the principle of (Enzyme-linked immunosorbent) assay was

employed for the evaluation of serum concentrations (Dinobot, Tokyo, Japan). Using a Biolabo-manufactured kit, serum calcium was determined by a colorimetric approach (France). The colorimetric method was used to determine calcium in accordance with the standard procedure (16).

Utilize the ready-made analyses created by the Spanish business BioKit- Sa to measure the amount of C-reactive protein. These analyses comprise the Solutions and reagents are prepared from the company on the principle of method (Latex Agglutination).

Statistical analysis:
Mean and standard deviation were calculated using SPSS 17 for all study statistics (SD). There was a T-test conducted to determine the significance of the mean value difference. A P> 0.05 value denotes non-significantly, whereas a p 0.05 number denotes significance. significantly.

Results and discussion

The results of the various biochemical factors for patients and controls that were looked at in the study are as follows:

Table 1: Mean ± SD of women's age and BMI among different studied groups.

Parameter	Control Mean ± S. D	Elderly group Mean ± S.D
Age (years	28±9.8	77.5 ± 16
BMI (kg/m2	25.7±1.1	26.0±1.6

Leptin levels in the blood
Serum leptin levels rose considerably in the senior population in comparison to the groups serving as controls, as shown in Table 2 and figure1. Leptin levels rise with age, according to these findings, which are consistent with previous research (17,18). Women's higher levels of adipose tissue, which trigger fat cells to generate more leptin, are responsible for the hormone's elevated levels. Some research suggests that leptin levels may serve as a biomarker of body fat. This is because they have more adipose tissue, which causes fat cells to release more leptin.

The level of leptin is thought to be a good predictor of body fatness (19). It has been hypothesized that hypothalamic leptin receptor signaling may be impaired with aging, decreasing leptin responsiveness (20). A rise in leptin could be seen as a risk factor because it has been linked to a higher risk of insulin resistance, a rise in the production of inflammatory cytokines, and the start of depressive symptoms. (21), (22).

High leptin concentrations, particularly in middle-aged women, have recently been linked to decreased physical function in the elderly. 23,24. As a result, older adults have higher levels of leptin compared to younger adults because of their increased fat mass.

Serum adiponectin levels and other parameters

As seen in Figure 1, the elderly had significantly lower serum levels of adiponectin than the control groups. According to previous studies, these findings are consistent (25). Adipokine levels decrease with age, according to Vilarrasa et al. Cellular senescence and mitochondrial dysfunction are common signs of aging. These include a slowing metabolism, malfunctioning adipose tissue, and resistance to insulin. (26). A decrease in adiponectin levels in the elderly is predicted because insulin resistance increases with age (Cnop et al., 2003) (27). Diabetes and obesity are closely linked to normal aging because of insulin resistance, which leads to more fat storage in the central and especially the abdominal depot (28). As a result of these changes, the level of adiponectin is likely to go down.

Adiponectin can be secreted by adipocytes; secretion varies with age, and circulating levels are decreased in cases of insulin resistance and obesity (29). Insulin resistance and atherosclerosis are both combated by adiponectin's anti-inflammatory capabilities (30). Interleukin-6 and TNF-α are cytokines that block adipocytes from secreting adiponectin when the adipose compartment is stimulated. (7). (8).

Proinflammatory cytokines stop preadipocytes from maturing and differentiating, which makes adipocytes age more quickly. Serum (IL-6), CRP, and TNF levels all rose in comparison to the group serving as a control (Table 2). These outcomes are in line with earlier research. Even though most healthy people have low, Amount of levels of IL-6 have been found to be higher in older people, with concentrations rising much higher in the extremely elderly, according to research (31). Furthermore, numerous scientists have also studied, TNF-alpha and C-RP are two examples of inflammatory mediators. and discovered that their concentrations rise with age (32). Bruunsgaard et al. found that plasma values of TNF-a and tIL-6 were elevated in aged people (33) Aging causes the lipids that build up in visceral adipose tissue to change, which is accompanied by changes in adipose tissue make it easier for the body to make classical cytokines (34,35).

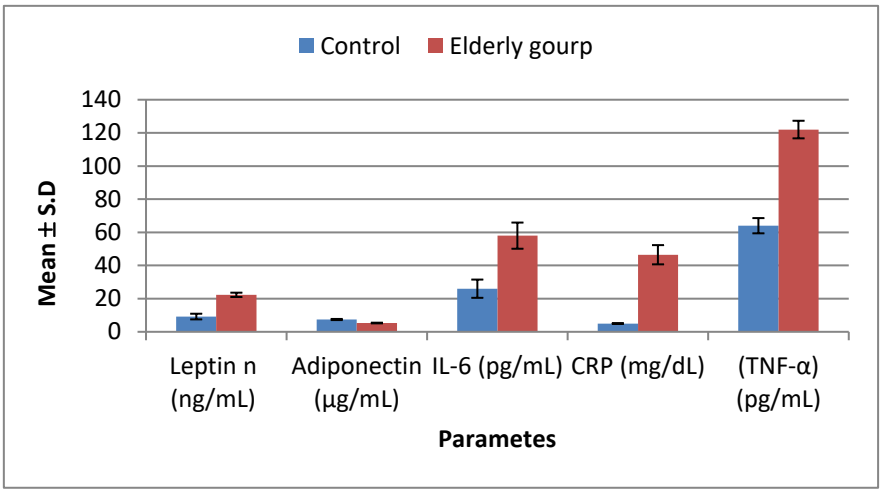

Figure 1 The parameters: the amount of control elderly people and a control group.

Serum Vitamin D3

Based on the data in figure 2, the levels of vitamin D3 in the blood of the older people were much lower than those of the control groups, these results matched what was found in a study by (36). Suryanarayana et al. conducted another study and discovered that 56.3% of people over the age of 60 had vitamin D insufficiency (37 %). The synthesis of vitamin D in the skin, the absorption of calcium from the bloodstream in the form of 1,25(OH)2D, and the creation of 1,25(OH)2D by the kidneys are all negatively impacted by a lack of sunlight exposure and exercise (37, 38, 39). Growing evidence shows that changes in renal function are linked to an elevated prevalence of vitamin D insufficiency. Indeed, it is because of the decline in renal 1-hydroxylase activity with age, which the main reason responsible for the quantity Vit D, along with the decreased hepatic 25-hydroxylase activity linked to uremia (40). As was discovered by Xie et al. (41) (hypocalcemia in the elderly can be explained by the fact that the incidence of chronic renal disease rises with age. Despite having a normal renal function, the elderly are at risk for severe VD deficiency, according to a recent study. (42).

Serum Calcium

figure 2 shows that there is a small but significant difference in serum calcium ($p > 0.05$). These findings align with those of prior other studies (43) that discovered older participants had lower serum calcium levels than younger ones. The frequency of hypocalcemia was found to be 61.3% among those over the age of 60 in a study by Catalano et al (44).

According to a study by Liu et al. in 2020, the most prevalent causes of hypocalcemia in the elderly include decreased food uptake and absorption, altered calcium homeostasis, renal failure, insufficient or resistant parathyroid hormone, inadequate vitamin D, and renal failure, insufficient or resistant parathyroid hormone, inadequate vitamin D, and. (45, 46, 47).

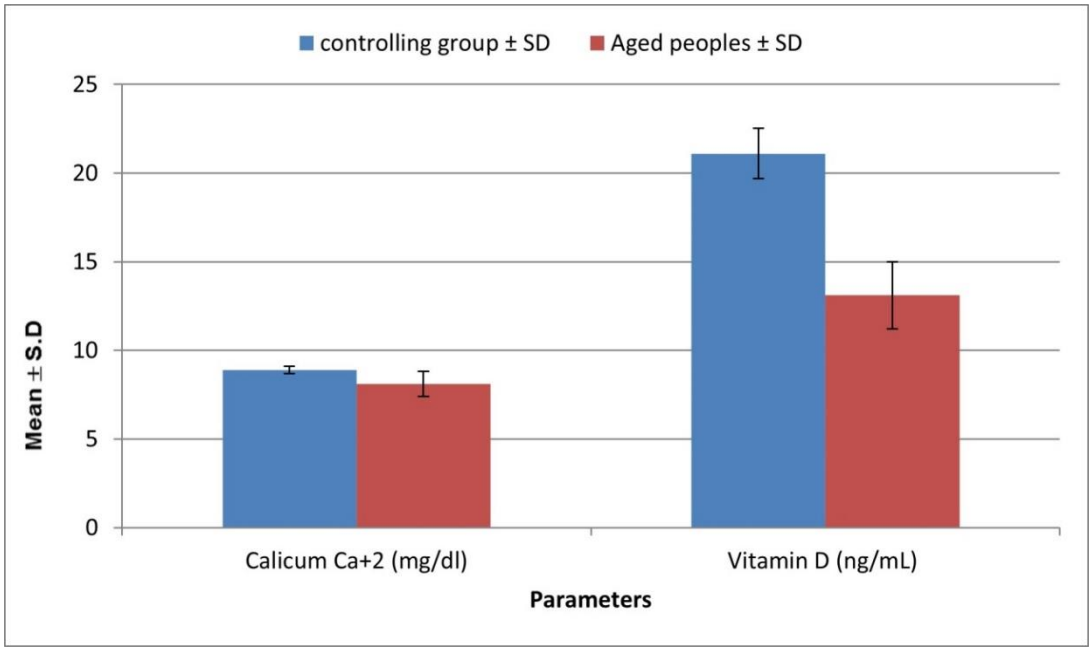

Figure 2: Serum level of calcium, vitamin D3.

Conclusion:
This study showed that high concentrations of leptin, interleukin-6 and tumor necrosis factor-alpha, CRP, may be connected to getting older. It also showed a big drop in the levels of adiponectin, vitamin D, and calcium, and showed the role of inflammatory mediators as reliable biomarkers for the detection of weakness and debilitation experienced by the elderly and Inflammatory cytokines play a key role in reducing the immune response, the change in the levels of inflammatory cytokines increases the likelihood of the body being exposed to various diseases that are associated with age, as the increase in inflammation is closely related to the increase in diseases and the occurrence of mortality.

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Availability of data and materials
Upon a reasonable request, the relevant author will supply the datasets used and/or analyzed for the current study.

Authors' contributions
Both Mahmoud and Taha collected the samples, Mahmoud worked on estimating the quantity of variables measured in the research, and Taha worked on writing the research with Hassan and Taha, the results were analyzed statistically by Mahmoud

Ethics approval and consent to participate
It complies with the terms of the Helsinki Declaration, as amended in Fortaleza, Brazil, in October 2013. According to the research documented in the College of Basic Education, Science Department/University of Mosul minutes on 12/13/2020, written informed permission and patient approval for publishing were obtained from all patients in the current study.

Patient consent for publication
For the release of their data and any associated photos, written informed consent was given by each participant in the current investigation.

Competing interests

Conflict of interest

The researchers assert that there is no contradiction any competing interests.

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