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Evaluation of Calcium, Vitamin D, Aromatase and Estradiol in Patients Suffer from Impotence in Bald city

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Abstract

The current effect of some biochemical characteristics in men with erectile dysfunction (ED), included 90 blood samples of healthy men and patients with ED. The study samples were divided into two main groups, Group A is the control group which included 20 people and Group B included 70 patients with ED. The study evaluated some biochemical indicators (Calcium, D3 vitamin, aromatase and estradiol. there was an significant increase in Calcium in patients, while the effectiveness of D3 vitamin decreased in patients in the study group, There was no significant superiority of Estradiol hormone in healthy subjects in the control group, and the results did not show any superiority of Estradiol hormone in patients in the study group, Highly significant increase in aromatase in patients in the second group (the study group), while the results of the study showed that the percentage of aromatase was within normal limits in people in the control group, We can conclude that vitamin D3 plays a role in the treatment of people who suffer from impotence if the level of calcium is low, also the absorption of calcium decreases and its representation inside the body decreases when the level of vitamin D3 decreases.

Introduction:

Erectile function is controlled by complex mechanisms [1] including the vascular and nervous systems [2,3]. One of the most important materials is nitric oxide (NO). After NO is releasing in the penis, corporal smooth muscle relaxes. However, when NO production is decreased, the erectile function weakened, resulting in ED. The relaxant system is also important for the erectile function [4]. The relaxant system is controlled by both the endothelial and the nervous systems. When the upper stream of smooth muscle relaxant system is weakened, ED is caused by smooth muscle relaxation. In contrast, corporal smooth muscle contraction is controlled by constrictors, such as noradrenaline in the flaccid state [5]. However, if the contraction be upregulated in some situations, ED would be caused [6]. The relaxation of arterial and trabecular penile smooth muscle is needed to achieve and maintain penile erection. Penile smooth muscle tone is under the control of relaxing and contractile mediators that are released from autonomic nerve terminals and the endothelia of corpora cavernosa lacunar spaces and penile arteries. The endothelium seems to play a crucial role in

facilitating the erectile response [7]. In fact, in ageing and vascular diseases associated with endothelial dysfunction such as hypercholesterolaemia and hypertension, a high prevalence of erectile dysfunction is also observed. Diabetes is associated with endothelial dysfunction, as well as with a high incidence of erectile dysfunction [8].

Nitric oxide is a key mediator of endothelium-dependent relaxation. However, the existence of an unidentified endothelial factor that promotes smooth muscle hyperpolarization and relaxation and is resistant to nitric oxide synthase and cyclooxygenase inhibition has been clearly established, which has particular functional relevance in small arteries [9], Calcium dobesilate has been extensively used as an orally administered angioprotective agent, especially in the treatment of diabetic retinopathy. Although its mechanism of action is poorly understood, this compound has been shown to enhance endothelium-dependent relaxation of aorta in rabbits and diabetic rats, as well as to improve endothelial function in diabetic patients. This could be related to the *in vitro* capacity of increasing endothelial nitric oxide synthase activity by magnesium dobesilate [10], Vitamin D is primarily known for its role in bone health and endocrine diseases such as diabetes. Researchers have suggested that Vitamin D plays a role in effectiveness with your sexual function. "Recent clinical works have suggested that low vitamin D levels may somehow be associated with the occurrence of sexual disturbances, especially erectile dysfunction [11], Many ED patients are Vitamin D deficient, particularly patients with arteriogenic ED. Epidemiological data in humans have shown that Vitamin D Disease is associated with hypertension, left ventricular hypertrophy, increased arterial stiffness, and endothelial dysfunction in normal subjects [12]. Men with ED have an increased prevalence of endothelial dysfunction, and VD may improve endothelial function A placebo-controlled randomized trial demonstrated that even a single large dose of VD improves endothelial function in patients with type 2 diabetes and VD disease. Since endothelial function improvement is the cornerstone of the treatment of ED, VD supplementation may be beneficial in the treatment of ED patients [13]. Traditionally, testosterone and estrogen have been considered to be male and female sex hormones, respectively. However, estradiol, the predominant form of estrogen, also plays a critical role in male sexual function. Estradiol in men is essential for modulating libido, erectile function, and spermatogenesis. Estrogen receptors, as well as aromatase, the enzyme that converts testosterone to estrogen, are abundant in brain, penis, and testis, organs important for sexual function. In the brain, estradiol synthesis is increased in areas related to sexual arousal [14], Aromatase inhibitors may be an attractive alternative for traditional testosterone substitution in elderly men because these compounds can be administered orally once daily and may result in physiological 24 h testosterone profiles. Additionally, misuse of aromatase inhibitors is unlikely since testosterone levels will not be stimulated to vastly supraphysiological levels. A small, controlled study demonstrated that anastrozole in a dose of 1 mg daily during 12 weeks will result in doubling of the mean bioavailable testosterone level in older men [15].

A more recent study also showed a moderate but significant effect of aromatase inhibition on estradiol and testosterone levels in older men. Treatment with atamestane 100 mg once daily resulted in a 40% increase in total testosterone levels after 36 weeks. However, no beneficial effects were seen on muscle strength, body composition or quality-of-life scores. A similar increase of testosterone levels in the absence of effects on body composition and

strength was reported in a study, in which elderly men with borderline low levels of serum testosterone were treated with anastrozole during 1 year [16].

New diagnostic tests make possible the recognition of specific causes of erectile dysfunction [17] sexual function shows that while Testesterone treatment improved sexual function in hypogonadal men, Testesterone supplementation had No effect on erectile function in eugonadal [18]. The role of androgens in erectile function remains controversial.

Due to the importance of the effect of some biochemical and hormonal parameters in impotance, this study was conducted, so the objectives of this study are: determine level effect of Calcium on ED patients and its relationship to the disease, the effect of vitamin D3 level on ED patients and its relationship to impotence, the effect of the hormone estradiol on ED patients and its relationship to impotence, the effect of the aromatase enzyme level on ED patients and its relationship to impotence.

Materials and methods of work

Sample distribution:

The study was carried out in the College of Applied Sciences / Samarra University for the period (sampling period) from 2022/9 /1 to 2022 / 11/1 on a sample consisting of 90, and the observations of each patient were recorded according to the diagnosis of the specialist doctor.

The experiment was conducted on 90 blood samples distributed to 70 samples with sexual dysfunction and 20 samples including healthy people, where special tests were conducted to estimate Calcium based on the working method used in the kit equipped with manufacturing company Biolabo from France enterprise and vitamin D3 based on the working method used in the kit equipped with manufacturing company finecare from china and estradiol based on the working method used in the kit equipped with manufacturing company finecare from china enterprise and aromatase based on the working method used in the kit equipped with manufacturing company sunlong biotech from china enterprise **.**

Statistical analysis:

The results were represented as mean ± SD for all values. The data were analyzed for critical contrast utilizing t-test (P≤0.05) by Minitab program to compare the chemical variables between two groups (19).

Results and discussion:

The table (1) of total parameters in current study:

Parameters	Mean ± SD	
	G1 n=20	G2 n=70
Calcium (mg/dl)	8.34 ± 0.69 A	9.95 ± 1.37 B
D3 vitamin (ng/ml)	42.05 ± 6.90	20.78 ± 4.99

	A	B
Esrtradiol (pg/ml)	97.68 ±31.38	93.66 ± 30.86
	A	A
Aromatase (ng/ml)	0.60 ± 0.19	1.99 ± 0.65
	A	B

Different letters within the same row mean that there is a significant difference at the probability level P ≤ 0.05. Similar letters mean that there is non-significant difference.

1. Calcium

From Table (1) and figure 1 the results showed a significant superiority in the level of calcium among individuals in the patients group, as the values of calcium in the blood of patients reached (9.9586 ± 1.37456) mg/dl, while the values of calcium in the group of healthy people reached (8.3400 ± 0.69767). mg/dl.

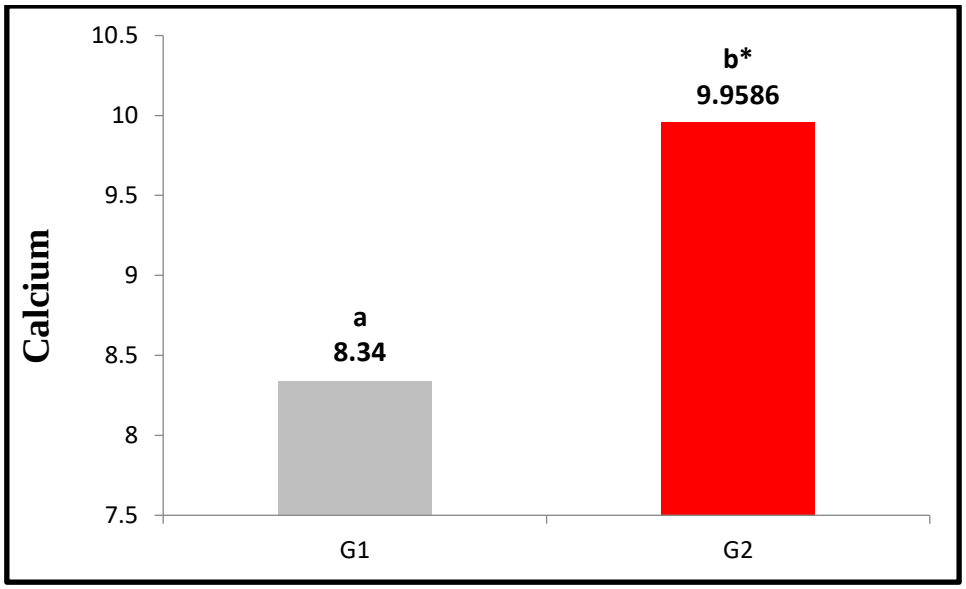

Fig. 1 Calcium level in the serum of the groups under study.
* Means that there are significant differences between the means ** (P≤0.01) and * (P≤0.05) and NS, there is no significant scrub.

Through the results of the statistical analysis of the study of the effect of calcium on patients with dysfunction, it was found that the level of calcium in the group of patients had given a significant rise, and this rise is attributed to the reason for the low level of vitamin D3, which affects this disorder in calcium levels to the effect on the lack of neurological response in the region The penis, and this matter in turn reduces the effect of the nerve stimulus on the erection, as these results were consistent with what was reached by (Pivovarova and Andrews) [20] where he reported that calcium disturbance in the elderly usually occurs due to a lack of vitamin D3, which leads to disorders in the functioning of tissues, including tissues Nervousness, because nerve tissues are strongly affected when calcium is disturbed, and this in turn affects the erection process, as (Kawamata, and Manfredi) [21] explained that calcium contributes to giving the body a good amount of energy to carry out various vital processes, and therefore the lack of calcium reduces sexual desire and increase erectile dysfunction as a result of the constant feeling of fatigue, lack of sleep and other symptoms, as the same

researcher indicated that calcium deficiency causes many disorders related to irregular heartbeat, and it is known that such problems are among the common causes of sexual weakness in men, as it is necessary for the heart to work In a correct way so that the blood is pumped to the genitals in an amount sufficient to feel sexual desire (Ahmadi)[22] reported that the relationship between vitamin D3 and calcium is very close, as vitamin D3 increases the body's absorption of calcium, so there is a close relationship between these two elements in the body. The study indicated the role of vitamin D3 in strengthening sexual desire in men who suffer from a deficiency in vitamin D3 levels, and the result indicated that the levels of orgasm increased in men who took vitamin D3 for a period of time compared to men who did not take it, and this result was consistent with what was found (Aggarwal) [23] point out the importance of vitamin D3 for erection in men, as the study found that men with low levels of vitamin D3 have lower levels of testosterone, which is important in the erection process, compared to other men.

In a study conducted on the effect of calcium on erectile dysfunction in men, the deficiency in the level of vitamin D3 affects the man's sexual health, as it affects the dilation of the arteries, so the amount of blood reaching the penis decreases, which causes erectile dysfunction, and the higher the vitamin D3 level decreases, the higher the severity of the condition (Asp) [24]. prostate cancer may occur due to calcium disturbances and vitamin D3 deficiency, as it was found that there is a relationship between vitamin D3 deficiency and an increased risk of prostate cancer in women. Many men, and one of the symptoms of vitamin D3 deficiency in men is their lack of sexual desire, due to the possible effect of low vitamin D3 levels on raising calcium levels and negatively reducing testosterone in men (Zhu) [25].

2. D3 vitamin.

The results of the statistical analysis of table (1) showed that there was a significant superiority in the level of vitamin D3 among healthy people in the control group, as it reached (42.0545 ± 6.90959) ng/ml, which is within the normal levels in the body, as the normal range of vitamin D3 ranges from 30-50 ng. /ml, while the level of vitamin D3 in patients in the second group reached (20.7850 ± 4.99007) ng/ml, which is less than the normal rate in the body, as this decrease works to disturb the absorption and representation of calcium and phosphorus in the body Figure (2), which causes fragility Bones, erectile dysfunction, and heart muscle weakness.

These findings are consistent with the findings of (Caretta) [26], a very recent cross-sectional analysis (3390 men over 20 years of age, free of atherosclerotic cardiovascular disease (ASCVD) also reported that vitamin D3 was associated with an increased prevalence of ED. In support, low vitamin D3 levels <20 ng/mL was associated with an increased risk of ED, as low prevalence of ED was associated with vitamin D3 levels >35 ng/mL. When the researchers narrowed their analyzes to 562 men (out of 3,390 men) who had adjusted for sex hormone levels, the association between vitamin D3 and ED became stronger. The biological association between vitamin D3 and ED shows several overlapping mechanisms that could indicate that the association of vitamin D3 with ED appears to be independent. on sex hormones (Talib) [27].

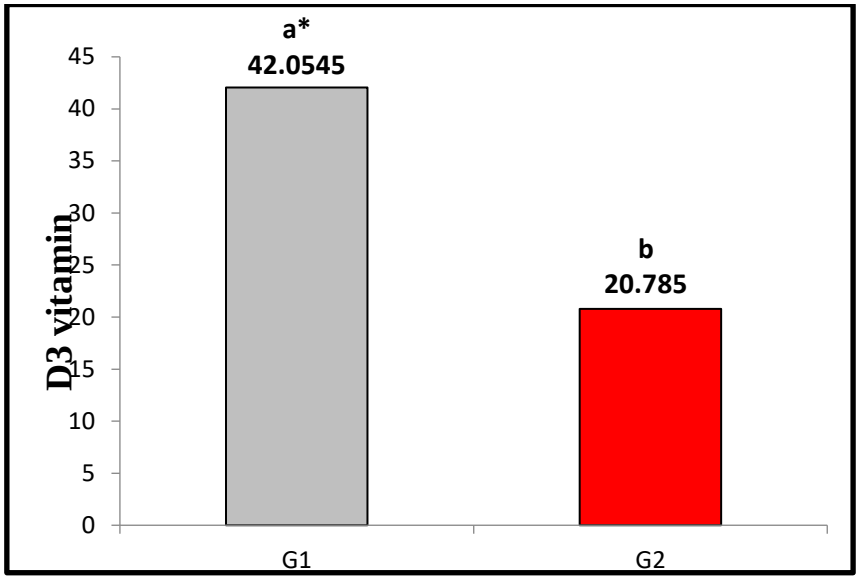

Fig. 2 D3 vitamin level in the serum of the groups under study.
* Means that there are significant differences between the means ** (P≤0.01) and * (P≤0.05) and NS, there is no significant scrub.

(Barassi)[28] indicated that there are several risk factors in the etiology of ED that may be directly arising from vitamin D3. Since recent literature has demonstrated the importance of VD on erectile function, (Fernandes-Lima) [29] investigated the effects of a VD-restricted diet on the shape of female offspring of Wistar rats. (Fernandes-Lima) [30] demonstrated that vitamin D3 restriction during the perinatal and postnatal periods caused metabolic and structural changes and represented important risk factors for ED in the adult offspring's penis. Recent findings indicate that vitamin D3 is an important micronutrient in maintaining the cellular structure of the penis. In other words, the human body requires vitamin D3 for proper anatomical development of the penis during embryonic life.

These findings are in agreement with the findings of (Corona) [31] The pathophysiology of ED is multifactorial, but a common point is vascular perturbation associated with decreased endothelial function. Indeed, one of the most important mechanisms of vitamin D3 on erectile function appears to be through endothelial integration (Tare and Andrukhova) [32,33]. At molecular levels, vitamin D3 stabilizes the quiescent endothelium, regulates specific stages of endothelial activation, and is involved in the repair of damaged endothelium in in vitro and in vivo models. 12 recent cross-sectional studies including 2086 subjects from different ethnic groups showed an association between endothelial dysfunction and VDD Also, vitamin D3 may directly protect endothelial cells from oxidative stress, thus, VDD may contribute to ED through inflammation (Al-Dujaili) [34].

Many ED patients suffer from vitamin D3 deficiency, especially patients with arterial ED(Barassi) [35]. The same researcher noted that epidemiological data in humans showed that VDD is associated with hypertension, left ventricular hypertrophy, increased atherosclerosis, and endothelial dysfunction in normal subjects. These findings are consistent with the findings of (Vlachopoulos)[36], who indicated that men with ED have an increased prevalence of endothelial dysfunction, and vitamin D3 may improve endothelial function. A randomized, placebo-controlled trial showed that even a single large dose of vitamin D3

improved endothelial function in men Type 2 diabetics and VDD. Since improving endothelial function is a cornerstone of ED treatment, vitamin D3 supplementation may be beneficial in the treatment of ED patients.

3. Estradiol hormone

The results of the analysis of Estradiol hormone showed that the obtained values did not show significant differences as shown in Table (1).

These results are in agreement with the findings of (Wu) [37], who reported that there were no significant differences between due to the effect of estradiol hormone and erectile dysfunction in men (Figure 3).

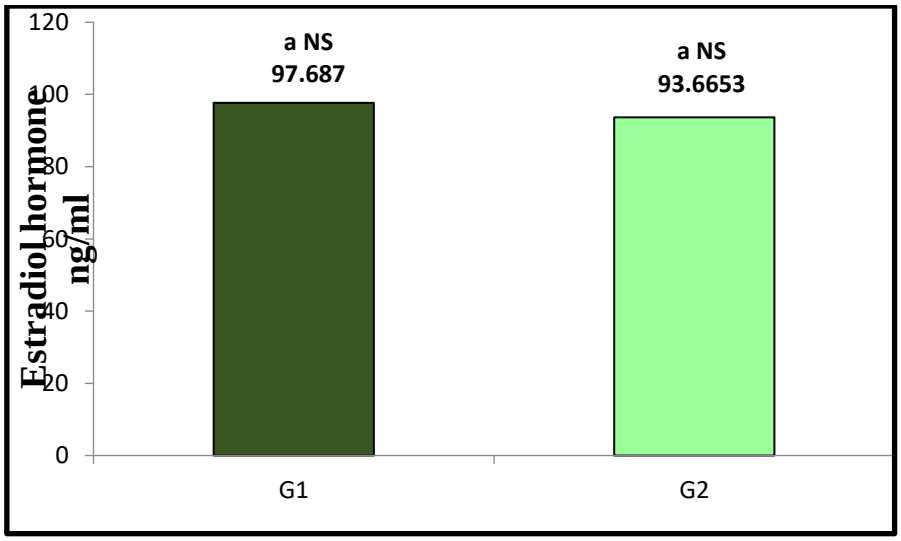

Fig. 3 Estradiol hormone level in the serum of the groups under study.
* Means that there are significant differences between the means ** ($P \leq 0.01$) and * ($P \leq 0.05$) and NS, there is no significant scrub.

While these results did not agree with what was reached by(Chen), who reported that there were highly significant differences for Estradiol hormone in men with ED, as the same researcher indicated that the rise in Estradiol hormone is usually due to advancing age as well as taking some medications such as corticosteroids (such as prednisone), may increase the pharmacological and toxic effects of corticosteroids. Phenytoin may reduce seizure control and reduce the effect of estrogen [38].

Cytochrome 3a4 inducers such as phenobarbital, carbamazepine, modafinil, rifampin, St. John's wort, topiramate, and this result was consistent with what was found by(Castelló-Porcar) [39] who reported a significant increase in estradiol and indicated that an increase in this hormone causes Stabilization of the action of Estradiol hormone, which causes erectile dysfunction in men.

4. Aromatase

Through Table (1), the results showed that there was a highly significant superiority of the aromatase in the second group (patient group), as it reached (1.9973 ± 0.65454) Iu, while

the values of the aromatase level in the group of healthy people amounted to (0.6018 ± 0.19275) In Figure (4).

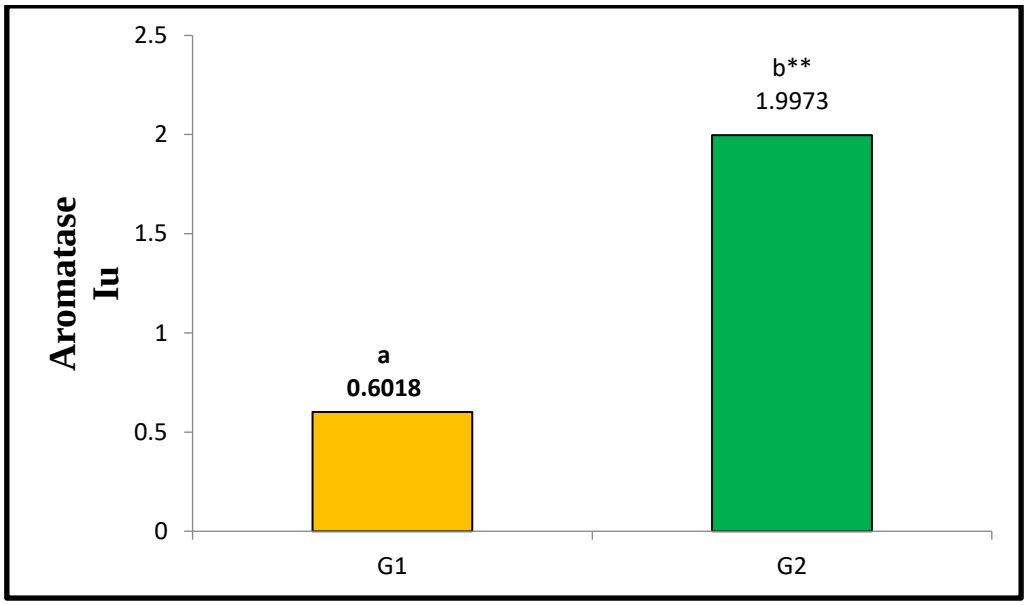

Fig. 4 Aromatase activity in the serum of the groups under study.
* Means that there are significant differences between the means ** ($P \leq 0.01$) and * ($P \leq 0.05$) and NS, there is no significant scrub.

Through the results, it was found that the reason for the increase in the aromatase in men with ED in the second group is due to the lack of production of Testosterone hormone, which significantly increases the production of the aromatase enzyme and thus the production of estrogen in men, as well as causes a decrease in androgens in general, and that their low levels in the body lead to Aromatase enzyme increased in people with ED, as these results were consistent with what was concluded by (Villeneuve) [40], who stated that the high levels of aromatase in the body is due to a lack of testosterone hormone production in the body, as indicated by (Blaes) [41] that the high Aromatase levels in the body are due to the lack of testosterone hormone production, as well as the incidence of some diseases such as heart disease, osteoporosis, and taking medications and drugs such as tamoxifen. Also, the reason for the high levels of aromatase is because the increase in estrogen levels in males results in many problems, such as premature closure of the epiphysis (end of long bones), gynecomastia and low testosterone. Therefore, an aromatase inhibitor was used to prevent the conversion of androgens into estrogens, to treat many diseases such as late hypogonadism, hormonal disorders that lead to premature puberty in children, impotence, and gynecomastia in men (Brown) [42].

As indicated by(Gibson Brown) [43] that estrogen in men is important for sexual function, but when estrogen levels rise, it causes a significant increase in aromatase in men, which affects general health, growth, and sexual function

Conclusion

There is an effect of some biochemical factors on erectile dysfunction in men, including calcium, where it was found that the level of calcium affected and increased in the group of patients, and the most common reason is the low level of vitamin D3, which increases the absorption of calcium and its representation inside the body, while the effect of vitamin D3 decreased in the group of patients, as this deficiency works to disturb the absorption and representation of calcium in the body, and it did not The estradiol hormone showed no effect on erectile dysfunction in men, and the statistical analyzes showed that the level of the aromatase enzyme had a significant effect on patients with ED

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تقييم الكالسيوم وفيتامين د3 والأروماتيز والإستراديول في المرضى الذين يعانون من العجز الجنسي في مدينة بلد

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الخلاصة:
التأثير الحالي لبعض الخصائص البيوكيميائية لدى الرجال المصابين بضعف الانتصاب شمل 90 عينة دم لرجال أصحاء ومرضى ضعف الانتصاب. تم تقسيم عينات الدراسة إلى مجموعتين رئيسيتين، المجموعة (أ) هي مجموعة الاصحاء التي ضمت 20 شخصًا والمجموعة (ب) تضمنت 70 مريضًا يعانون من الضعف الجنسي. قيمت الدراسة بعض المؤشرات البيوكيميائية (كالسيوم وفيتامين D3 وأروماتيز وإستراديول)، حيث كانت هناك زيادة معنوية في الكالسيوم في المرضى، بينما انخفضت فعالية فيتامين D3 في المرضى في مجموعة الدراسة ، ولم يكن هناك تفوق معنوي لهرمون استراديول للأشخاص الاصحاء في مجموعة الاصحاء، ولم تظهر النتائج أي تفوق لهرمون استراديول في المرضى في مجموعة الدراسة، زيادة معنوية عالية في أروماتيز في مرضى المجموعة الثانية (مجموعة الدراسة)، بينما أظهرت نتائج الدراسة أن النسبة المئوية للأروماتاز كانت ضمن الحدود الطبيعية لدى الأشخاص في مجموعة الاصحاء.