Published Online First: December, 2024
https://doi.org/10.21123/bsj.2024.11669
P-ISSN: 2078-8665 - E-ISSN: 2411-7986
Baghdad Science Journal

Evaluation of DPP4, TNF, and Lipid Profile Levels as Early Indicators in Infertility Among Iraqi Women

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Received 29/05/2024, Revised 12/10/2024, Accepted 14/10/2024, Published Online First 20/12/2024

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Abstract

Infertility is one of the problems facing women and men. Obesity, lipid level disorders, and insulin resistance are among the risk factors that cause infertility, in addition to other relevant factors. The current study aimed to investigate the effect of obesity and lipids imbalance, together with studying the relationship for each dipeptidyl peptidase -4 (DPP-4) and tumor necrosis factor –α (TNF-α) infertile women compared to healthy women, to determine the possibility that they are being diagnostic and indicative factors of the disease. The study included 50 participants, age range (15-34) years, who attended Kamal Al- Samarai Hospital in Baghdad, Iraq. The participants were divided into two groups; patients group (30 infertile women) and control group (20 healthy women). Levels of fasting blood sugar (FBS), lipid profile, dipeptidyl peptidase -4 (DPP4), tumor necrosis factor –α (TNF-α), follicle-stimulating hormone (FSH), luteinizing hormone (LH), insulin and testosterone were evaluated. FBS and lipid profile levels were determined on the basis of spectrophotometric methods. Levels of DPP4, TNF-α, FSH, LH, insulin and testosterone were estimated by their ELISA kits. BMI, HOMO-IR, Atherogenic index were calculated. The results showed high levels of FBS, lipid profile (except HDL), DPP-4, TNF-α, LH, Testosterone and decrease of FSH level in patients compared to the healthy women.In conclusion, increasing lipid profile levels, obesity, atherogenic index, insulin resistance values approve the association of infertility with obesity, lipid disorders, diabetes and atherosclerosis diseases. Furthermore, DPP-4 and TNF-α are useful as good diagnostic factors for women's infertility.

Keywords: Dipeptidyl peptidase -4, Follicle-stimulating hormone, Infertility, Luteinizing hormone, Obesity, Testosterone, Tumor necrosis factor –α.

Introduction

Obesity is defined as abnormal weight or excessive fat accumulation, which can be identified by the body mass index, where a value of thirty or more indicates obesity and a value of twenty-five indicates overweight. A characteristic of this condition is the excessive accumulation of triglycerides in adipose tissues, which can be used as nutrients by other tissues via the lipolysis pathway in the event of an essential nutrient deficiency, as in cases of starvation, fasting, and strenuous activities [1].

The phenotype changes according to the transition from underweight to obesity. This transition is the degree of chronic accompanied by a low inflammation, which can be identified by elevating the levels of free fatty acids in the circulatory system with soluble factors of pro-inflammation such as TNF-α, in addition to the activation and permeation of immune cells to the sites of inflammation. Obesity is often associated with dyslipidemia, which can be detected by an increased level of low-density lipoproteins, a decreased level of high-density lipoproteins, and an

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elevated triglyceride level. Chronic inflammation and lipid imbalance lead to an increased risk of heart disease and type II diabetes mellitus [2].

The leading causes of infertility can be attributed to several reasons, including obstruction in the fallopian tube, instability of the menstrual cycle, hormonal disturbance in women, and defects that may occur during the ovulation process. In addition to advanced age in women and high obesity, that is expressed by the body mass index in couples. Also, unexplained infertility can be another cause [3]. Recently, the use of herbs and alternative medicine has emerged as an alternative to traditional treatment to treat infertility in women, according to claims that indicate that herbal treatment regulates hormonal disorders and treats cases of oxidative stress that affect public health. At the same time, a consensus on this has not been achieved [4]. The effectiveness of antioxidants that can be obtained as nutritional supplements was studied to investigate their effect on male fertility, which constitutes one of the cases of infertility in women. In general, it was found that the antioxidants positively impact stimulating fertility in men. It was also found that they help to reduce the state of infertility in women [5]. Studies indicated the importance of lifestyle on fertility. For example, physical activity and limited sleep are inversely related to their effect on fertility. There is a lack of agreement between studies in this area, and the need remains for more studies to confirm such claims [6].

The relationship between total and local oxidative stress factors in the serum and follicular fluid of an Iraqi infertile woman was investigated. The study includes various cases of infertility, like infertility caused by men, infertility caused by polycystic ovarian syndrome, and unexplained infertility. The study indicated that the general oxidative stress may provide reliable data about local oxidative stress in both healthy women and patients with Polycystic ovary syndrome (PCOS), and these data may be suitable for interpretation of the role of oxidative stress in failure in vitro fertility in patients with various reasons for infertility[7]. In the same field, some relevant prediction factors of successful pregnancy by *in vitro* fertility for Iraqi infertile women, which include testosterone, insulin-like growth factors, and dehydroepiandrosterone, were estimated. The role of these parameters is associated with the quality of the ovum, embryo, and follicle growth. The study referred to the fact that both testosterone and dehydroepiandrosterone have a prognostic use as predictive factors for successful pregnancy in both healthy women and infertile women with PCOS [8].

In another previous study, the association of growth differentiation factor 8 (GDF8) levels in follicular fluid to the results of in vitro fertilization in infertile women with PCOS and without PCOS (male infertility) was studied. It was found that the GDF8 level represents a sensitive marker for the quality of the embryo and a better acceptable predictor for the successful pregnancy rate with in vitro fertility [9]. The levels of ceruloplasmin ferroxidase and iron in follicular fluid and their correlation with *in vitro* fertility success rate were investigated. The study referred to the augmentation of iron levels in the follicular fluid of women with PCOS may cause a decrease in the pregnancy success rate when applied with the *in vitro* fertility method [10]. In a recent study [11], oligoasthenozoospermia was studied regarding sperm methylation outcome on sperm factor. The study showed no significant alterations between infertile men and seminal assay, but it found a significant correlation between DNA methylation and semen level, but no relation with morphological index.

Atherogenesis was developed due to the formation of plates in the inner layers of arteries. It occurs when an inflammation accompanies the lipid accumulation. This case varied significantly among individuals. The atherogenicity (AI) index is an excellent marker to assess the threat of atherogenic disorders and health subjects. The association between atherogenic index and cardiovascular disease in patients with type 2 diabetes was investigated. It was found that AI can be used as a reliable factor for detecting cardiovascular disease risk [12]. Moreover, it was found recently that high insulin resistance values are associated with atherogenic dyslipidemia. Insulin resistance value scales assist in categorizing the presence of atherogenic dyslipidemia [13]. Lipid indices are considered essential factors for specific glycemic regulators. They possess a more reliable analytical value than classic indicators. Thus, cholesterol, LDL, TGs and atherogenic indices can be applied as essential predictors of glycemic control [14]. Also, it was reported that the lipid profile could be used to identify patients with a higher risk of cardiovascular disease, notably when the lipid profile increased to higher levels or abnormal case [15]. In a recent study [16], it was reported that the lipoprotein atherogenicity is more significant than that in LDL. Thus, the drugs

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directed at these conjugated lipids are a substantial risk that can cause atherogenicity.

Lipid distribution and atherogenic factors have similar forms in infertile women as predictive factors, particularly TGs, which represent a based atherogenic index, consisting of a principal effect to develop atherosclerosis in this case [17]. Lipid disorders are considered the principal reason for developing female infertility. Subsequently, the levels of lipid profile and atherogenic indices are increasing in infertile women rather than in the healthy female group. Furthermore, an increase in atherogenicity idiocies among the patients group may lead to cardiovascular disease. So, periodic evaluation of lipid levels and atherogenicity indices is necessary for infertility [18]. The association between infertility and cardiovascular disease is observed through specific symptoms like obesity, early menopause, and irregularity of the menstrual cycle. The risk of CVD increased in the case of infertile women. It differed among the infertile females according to age and the type of infertility [19].

The enzyme dipeptidyl peptidase-4 (DPP4) has a variety of functions and biological roles due to its different properties in lipid accumulation, stimulation of the immune system, and resistance to antitumor agents. Furthermore, the level of this enzyme was found to be increased in patients with hepatic disorders. In addition to the preceding, the DPP4 enzyme is in direct contact with hormones, as it is a mobile enzyme in plasma and presents in blood vessels in endothelial cells. It is expressed in cells of the immune system, such as helper T cells, as well as in endocrine glands and in specialized fibroblasts, as in mammary glands [20]. Recently, it was found that the influence of fatness on Iraqi infertile females with the complications of coronavirus in terms of some relevant biochemical factors was investigated [21]; on the other hand, the association between obesity and diabetic complications was studied [22].

The essential biological function of DPP4 is attributed to its role in splitting peptides like glucagon-like peptide-1 to regulate the metabolism [23]. Dipeptidyl peptidase -4 is an abundant protein in cell membrane presence as a bound or soluble form. Its inhibitors include heterogeneous chemical drugs that possess various inhibition activities [24]. Also, DPP-4 splits some immunoregulatory peptides in addition to liberating chemotactic elements and stimulating the activity with the migration of the immune cells. Correspondingly, these activities of DPP-4 assess to excretion of reactive oxygen species and increase the action of phagocytic activity [25]. The serum level of DPP-4 in patients with the grave disease was considerably increased. Furthermore, the level of DPP-4 was wholly related to the severity of hyperthyroidism in grave disease patients [26]. In a recent study, it was recorded that the level of DPP-4 was significantly increased in the case of infertile patients with PCOS rather than healthy women [27]. It was recorded that DPP-4 inhibitors are used as a savior in the case of glucose tolerance, and they possess an essential role in recovering liver activity. So, inhibitors of DPP4 could serve as drugs in the case of glucose intolerance associated with DPP-4, which occurs due to liver disorders, in addition to being applied in the therapy of liver diseases [28]. In a more recent study [29], DPP-4 level was estimated in women with gestational diabetes mellitus and women with excessive gestational weight gain. The study reported that the level of DPP-4 in two patient groups was higher than in the healthy women group. It referred to that the DPP-4 level can be employed as a predictive factor for gestational diabetes mellitus.

Initially, Tumor necrosis factor alpha (TNF-α) was known as a factor that leads to necrosis tumor development. Then, it was found to possess other vital roles in the pathogenesis of immune diseases. Thus, the understanding of TNF-α role mechanisms will lead to facilitating the appropriative tools for the management of diseases [30]. In a recent study [31], it was found that the inhibitors of TNF have some excellent applications in infertile women with PCOS. Subsequently, the more significant general treatment effect can be applied in infertile PCOS patients receiving IVF-ET. On the other hand, one of the specialized studies in this field indicated that tumor necrosis factors could reverse the negative consequences of pregnancy during the first three months, but this is within the framework of research and investigation. So it required more studies to confirm its pharmacological effect in saving pregnancies at risk [32]. More recently, TNF-α level was evaluated in endometriosis of infertile women. The value of TNF-α was significantly increased with patients suffering from severe endometriosis disorders among other patients with infertility cases. The study suggested to further studies to understand the role and prognostic value of TNF-α in this type of disorders [33].

Women who are candidates for diabetes or are at the onset of type 2 diabetes have a more significant risk factor for infertility or miscarriage. This affects

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P-ISSN: 2078-8665 - E-ISSN: 2411-7986
Baghdad Science Journal

childbearing compared to women who do not have diabetes [34]. It was found that several medical conditions of infertility were linked to several disorders, such as type 2 diabetes, hypercholesterolemia, and high blood pressure. The study referred to the importance of health supervision specialists having a high level of knowledge to achieve a high level of care for pregnant women at risk of miscarriage and to understand the paths of metabolic complications that accompany the disease [35]. Therapeutic measures for infertility remain limited, and most of them are experiments on animals. Therefore, it becomes necessary to know the cellular mechanisms and the molecular characteristics of infertility caused by diabetes [36].

The present study aims to assess the levels of DPP-4 and TNF-α in infertile women as diagnostic and predictive factors for early prediction of infertility, together with studying the effect of obesity on the development of infertility and its risk on the progress of atherogenicity.

Materials and Methods

Blood sample collection

Every participant in the study carried out at the Kamal Al- Samarai Hospital in Baghdad, Iraq, provided verbally informed consent during the period from August 2022 to March 2023. A sample of fifty Iraqi women between the ages of fifteen and thirty years were chosen. Simultaneously, 30 obese infertile women and 20 healthy women were selected as the control group. Respondents were interviewed face-to-face to acquire information about their lifestyles and demographics through a pre-created questionnaire. The subject was asked to fast for ten to twelve hours before providing a blood sample. Every patient and the control group used a single-use disposable syringe that held five milliliters of blood. To separate the serum, 30 minutes of spinning at 3000 rpm was sufficient. An enzymatic immunoassay sandwich kit from (My BioSource, USA) was used to measure TNFα, DPP4, LH, FSH, Testosterone, and insulin in one milliliter of the patient's serum after it had been tested for blood glucose and lipid profiles (cholesterol, triglycerides, HDL, and LDL). The remaining serum was frozen at -20°C. BMI is calculated as follows: kg/m2 or weight in kilograms divided by height in square meters.

Statistical analysis

These analyses were carried out using SPSS version 26. An independent sample t-test was used to determine the significance of differences between the mean and SD. A p-value of 0.05 or less was judged significant.

Including criteria

1. Female patients were selected with infertility and obesity
2. Female age range: 15-34 years old.

Exclusion criteria

1. Patients with DM, any apparently acute inflammation, and any immunity diseases.
2. Parathyroid disorder.

Results

Table 1 shows the BMI, FBS, lipid profile, and atherogenic index results in both infertile and healthy women groups. The results of BMI showed highly significant differences between healthy and patient groups. Also, it was found that FBS levels significantly increased in the patients group than in healthy subjects. Similarly, the results of the lipid profile (except HDL) revealed a significant increase in infertile women compared to the healthy group. Furthermore, the calculated value of the atherogenic index in the patients group was higher than in the healthy group. Subsequently, these results confirmed the occurrence of dyslipidemia, which is the leading cause of infertility in women, besides disruption of glucose level in patients with infertility together with high disorders of lipid profile compared to the control group.

Table 1. Levels of FBS, lipid profile, BMI, IR and Atherogenic index in patients and healthy women

Parameters	Infertility women Group (No. 30)	Control women Group (No. 20)	p-value
BMI	32.68± 2.22	25.7±3.12	**0.001
FBS (mmol/L)	7.51±0.42	2.76±0.22	**0.001
Cholesterol (mmol/L)	8.95±2.02	3.67±0.50	**0.001

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Triglycerides (mmol/L)	6.28 ±1.47	1.35±0.17	**0.001
HDL (mmol/L)	0.42±0.22	1.87±0.49	**0.001
LDL (mmol/L)	4.85 ±1.75	1.35±1.19	**0.001
VLDL(mmol/L)	2.87±0.67	0.61±0.07	**0.001
Atherogenic Index	1.17±0.82	0.14 ±0.46	**0.001
Insulin resistance	7.44±2.49	0.98±0.57	**0.001

The results of Tumor necrosis factor alpha (TNFα), dipeptidyl peptidase-4 (DPP-4), and insulin are recorded in Table 2. The TNF-α level was higher (p=0.001) in the patients group than the control group. Similarly, the DPP-4 level was recorded to be a more substantial increase in the patients' group than in the control group. Also, the result of insulin level for the patients group was recorded as a considerable level in the case of the infertile women group than healthy women group. Also, the level of both LH and testosterone in the patients group was found to be higher than the control group, whereas the level of FSH was higher in the healthy group than the patients'. Subsequently, the ratio of LH/FSH in the patients group is higher than the healthy group. Furthermore, the calculated value of insulin resistance was found to be 7.44±2.49, which represents the abnormal value.

Table 2. Levels of TNFα, DPP4, and hormones group in patients and healthy women

Parameters	Infertility women Group (No. 30)	Control women Group (No. 20)	p-value
TNFα (ng/ mL)	203.27±45.20	63.22 ± 19.24	**0.001
DPP4 (ng/ mL)	59.78±11.25	30.45±8.20	**0.001
Insulin (mIU/dL)	10.85±0.9	6.6±0.59	**0.001
FSH (mIU/ mL	5.54±2.80	8.25±2.77	**0.001
LH (mlU/ Ml	8.78±4.63	4.83±1.92	**0.001
LH/FSH ratio	1.69±0.55	0.58±0.14	**0.001
Testosterone (ng/ mL	0.70±0.25	0.30±0.10	**0.001

ROC Analysis

The receiver operator characteristics (ROC) curve data of DPP4 and TNF- α are recorded in Table 3 and illustrated in Figs. 1-2. The results showed that the area under the curve of DPP4 was 0.984, which confirms that the DPP4 factor represents an excellent factor for the diagnosis of the studied disease case. Furthermore, the value of area under the curve for TNF- α was 0.773, this result indicated the acceptable of this factor as diagnostic factor for the studied case.

Table 3. ROC curve data for DPP-4 and TNF- α

Parameters	Area Under the Curve	Std. Error	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
DPP4	0.984	0.009	0.967	1.000
TNF-α	0.733	0.055	0.626	0.840

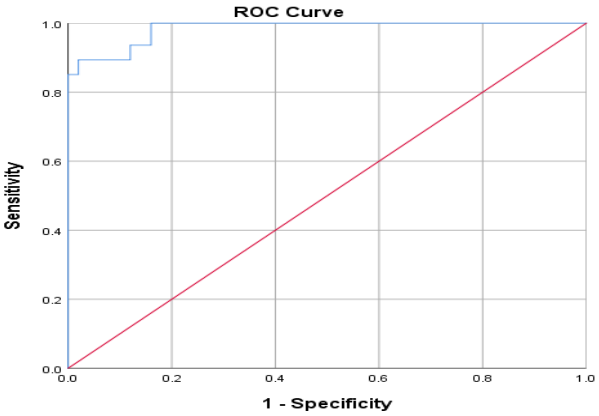

Figure 1. ROC curve for DPP-4

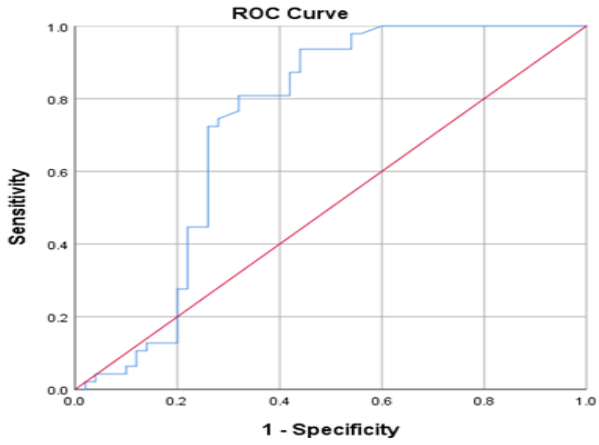

Figure 2. ROC curve for TNF-α

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https://doi.org/10.21123/bsj.2024.11669
P-ISSN: 2078-8665 - E-ISSN: 2411-7986
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Discussion

The term infertility refers to the failure to conceive after a full year of regular unprotected intercourse; about 10% of couples worldwide suffer from infertility [37]. In addition to obesity, there are some comorbidities, such as hyperlipidemia and inflammation, that are associated with infertility [38].

Heart disease (such as myocardial infarction and cardiovascular disease) is blood vessels disease has a strong and significant association with infertility [39]. All lipid profiles (except HDL-C levels) show a substantial increase in the patients group compared with the healthy group at (P values ≤ 0.01). In contrast, HDL-C levels were significantly lower in patients than in control at (P values ≤ 0.01). The results of Dipanshu Sur et al. [40] and Eqbal A. Gatea et al. [41] were similar to the results of the current research, which indicates a rise in fat levels such as TC, TGs, and LDL (8.95±2.02, 6.28 ±1.47 and 4.85 ±1.75 mmol. /L, respectively) and on the contrary, a reduction in the level of HDL (0.42±0.22 mmol. /L) in patients group than healthy people (TC, TGs, LDL and HDL: 3.67±0.50, 1.35±0.17, 1.35±1.19 and 1.87±0.49 mmol/L, respectively), as shown in Table 1. The results of FSH, LH, Testosterone, and LH/FSH ratio in the current study were (5.54±2.80, 8.78±4.63 mIU/mL, 0.70±0.25ng/mL and 1.69±0.55, respectively), which showed significant differences (P values ≤ 0.01) between patients and healthy groups (8.25±2.77, 4.83±1.92 mIU/mL, 0.30±0.10 ng/mL and 0.58±0.14 respectively), as noticed in Table 2, the differences are attributed to the development of infertility.

Furthermore, in this study, it was found that TNF-α concentration in infertility women (203.27±45.20 ng/ mL) is significantly higher (P values ≤ 0.01) than in healthy women (63.22 ± 19.24 ng/mL), as recorded in Table 2. Sayın et al. [42] referred to similar outcomes. In contrast, levels of TNFα have no significant increase in groups of pregnant and non-pregnancy women [43,44]; also, studies showed that tumor necrosis factor TNF inhibitors have specific applications in infertile women with POCS [45]. The analysis performed by S, Aboeldalyl et al. [46] reported that inflammation markers level was higher in infertile women compared to control. In addition to such supporting evidence, in another recent study, [47] was supported by the above-mentioned studies, which referred to increasing in TNFα level in infertility condition, indicating to need for further studies with the advanced strategies and selected patients to determine the TNF-α function in infertility.

It was found that the levels of factors indicating inflammation increased in the presence of infertility, including c reactive protein and the number of white blood cells. These factors are affected by body mass index and insulin resistance [48]. In another study, it was reported that the level of TNF-α has a positive correlation with insulin and fasting blood sugar in infertile women. The study concluded that the level of the factor may be an indicator of the risk of diabetes and insulin resistance in infertile women [49]. Subsequently, the results of TNFα in the current study agree with these studies.

Studies show that increased serum TNF-α levels in women with infertility are associated positively with BMI [50]. Also, studies referred to the vital role of the enzyme DPP4 in the metabolism of glucose sugar, as well as its presence in many and varied cells such as heart muscle cells, smooth muscles, and blood vessels, which indicates that it may contribute to the occurrence and development of cardiovascular diseases [51]. Current results suggest that such elevations in TNF-α levels may be associated with insulin resistance in infertile patients. These findings also imply that, rather than the presence of obesity, the metabolic outcome of obesity or the progression towards clinically relevant disease states are the triggering factors for the elevation of TNF-α. In this study, the DPP4 level was significantly (P values ≤ 0.01) higher in infertile women (59.78±11.25 ng/mL) compared with healthy women (30.45±8.20 ng/mL), as recorded in Table 2; these results are in agreement with Anoop S et al., [52]. It was found that a high level of the DPP4 enzyme is associated with obesity and insulin resistance, as it was also shown that the harmful levels of this enzyme are in people who suffer from excessive obesity and a high level of inflammation, which causes an escalation of the risk factor for heart disease. Furthermore, it was recently found that a high level of this enzyme is associated with polycystic ovary syndrome in comparison with healthy women [53]. Also, current results agree with other studies, [54, 55,] which reported the relationship between DPP4 with inflammation, metabolism, and fat homeostasis.

Many studies have been conducted to demonstrate the effect of obesity on infertility in women, including a very recent study that concluded that being overweight or obese affects the birth rate

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https://doi.org/10.21123/bsj.2024.11669
P-ISSN: 2078-8665 - E-ISSN: 2411-7986
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or clinical pregnancy, and this is entirely consistent with the results of the current study, which shows the condition of obese infertile women compared to the control group [56]. In another more recent study, it was reported that obesity causes many complications in women, including failure of the ovaries and uterus diseases, which lead to infertility. Therefore, this study recommends reducing weight before trying to get pregnant. The results of this study support the results of the current study, as obesity has an impact and relationship with the occurrence of infertility in women [57]. Obesity in women has become a global epidemic because it is associated with metabolic and endocrine disorders. Thus, obese women are more vulnerable to reproductive problems, including infertility and fetal growth defects. Many factors work with obesity to cause infertility, including insulin resistance, hyperinsulinemia, androgen excess, infections, and hyperlipidemia. Subsequently, weight loss is one of the factors that reflects the effect of obesity on fertility, pregnancy, and offspring. So current findings agree with these outcomes of the mentioned parameters [58].

A more recent study, [59,] focuses on studying the level of DPP-4 enzyme in women with gestational diabetes during the pregnancy period, and the results of the study indicated that the level of this enzyme increases in women with diabetes even after childbirth. The enzyme plays a vital role in glucose metabolism, and inhibiting its activity positively affects the regulation of glucose levels. Furthermore, the results of the DPP-4 in the current study revealed a significant increase in the patients group than healthy women. These results were supported by ROC result, which found that the DPP-4 parameter represents an excellent factor for diagnosis of this case of women's disease based on AUC value (0.984); this result agrees with numerous previous studies [60-62].

Also, the current result of DPP-4 was consistent with a recent study, which found that the DPP-4 level was increased in the case of polycystic ovarian syndrome [63]. The results of the current study are also consistent with the results of a more recent study, which indicated that infertility can share common pathways with other diseases, such as cardiovascular diseases, which can be expressed in terms of a high atherogenic index. It also indicated that infertility can occur through ovulation abnormalities and uterine fibroids as well as with low levels of HDL and high levels of cholesterol, TGs, and LDL [64]. The results of TNF in the current study showed consistency with the results of a more recent study regarding a higher level of this factor in patient women compared to non-patient ones. This demonstrates a distinctive immunological profile in patients who underwent infertility treatments. Additionally, the result of ROC showed the acceptable value of TNF-α as a diagnostic factor in the case of women with infertility [65].

Conclusion

Depending on the obtained results, it was found that both of dipeptidyl peptidase-4 (DPP-4) and tumor necrosis factor- α (TNF-α) represent good markers for monitoring and diagnosing women's infertility disease. Furthermore, the importance of these results was enhanced by ROC analysis data, which indicated that DPP-4 could be an excellent marker and TNF-α is an acceptable marker for this purpose. Also, the results of obesity, lipid profile, atherogenic index and insulin resistance are associated with infertility in women and atherosclerosis disease as a significant risk factor. Accordingly, this study suggests adopting a suitable diet and exercising regularly to maintain an average weight and avoid diseases caused by obesity, such as infertility and atherosclerosis.

Acknowledgement

The Department of Chemistry at the College of Science for Women at the University of Baghdad and the staff at Kamal Al-Samarrai Hospital deserve our gratitude and appreciation for their assistance in facilitating the completion of this work.

Author's Declaration

- Conflicts of Interest: None.
- We hereby confirm that all the Figures and Tables in the manuscript are ours. Furthermore, any Figures and images, that are not ours, have been included with the necessary permission for re-publication, which is attached to the manuscript.
- No animal studies are present in the manuscript.
- Authors sign on ethical consideration's approval.

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https://doi.org/10.21123/bsj.2024.11669
P-ISSN: 2078-8665 - E-ISSN: 2411-7986
Baghdad Science Journal

- Ethical Clearance: The project was approved by the local ethical committee at University of Baghdad.

Author's Contribution statement

KK, and FM: participated in designing the research idea, determining the study's factors, interpreting the results, preparing research, discussing the results, and determining the study's conclusions. FE. took part in the diagnosis of infertile women.

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تقييم مستويات ثنائي ببتيدايل ببتايديز-4 ، عامل التنخر الورمي ونمط الدهون كمؤشرات مبكرة للعقم بين النساء العراقيات

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الخلاصة

العقم هو أحد المشاكل التي تواجه النساء والرجال. تعد السمنة واضطرابات مستوى الدهون، وكذلك مقاومة الأنسولين، من عوامل الخطر التي تسبب العقم، بالإضافة إلى العوامل الأخرى ذات الصلة. تهدف هذه الدراسة إلى معرفة تأثير السمنة واختلال توازن الدهون مع دراسة علاقة كل من ثنائي الببتيديل ببتيديز-4 وعامل نخر الورم-الفا لدى النساء المصابات بالعقم مقارنة بالنساء غير المصابات به، لتحديد مدى إمكانية اعتمادها كعوامل تشخيصية ودالة على المرض. شملت الدراسة 50 مشاركاً، الفئة العمرية (15-34) سنة، الذين راجعوا مستشفى كمال السامرائي في بغداد، العراق. تم تقسيم المشاركين إلى مجموعتين؛ مجموعة المرضى (30 امرأة تعاني من العقم) ومجموعة السيطرة (20 امرأة سليمة). تم تقييم مستويات FBS، وانماط الدهون، وDPP4، وTNF-α، وFSH، وLH، والأنسولين والتستوستيرون. وتم تحديد مستويات FBS والدهون على أساس الطرق الطيفية. و تقدير مستويات DPP4 وTNF-α وFSH وLH والأنسولين والتستوستيرون بواسطة كتات ELISA الخاصة بهم. تم حساب مؤشر كتلة الجسم، HOMO-IR، ومؤشر تصلب الشرايين. أظهرت النتائج ارتفاع مستويات FBS، الدهون (باستثناء HDL)، DPP-4، TNF-α، LH، التستوستيرون وانخفاض مستوى هرمون FSH لدى المرضى مقارنة بالنساء الأصحاء. تؤكد زيادة قيم مستويات الدهون ومؤشر تصلب الشرايين ومقاومة الأنسولين ارتباط العقم بالسمنة واضطرابات الدهون والسكري وتصلب الشرايين. علاوة على ذلك، فإن DPP-4 وTNF-α مفيدان كعوامل تشخيصية جيدة للعقم عند النساء.

الكلمات المفتاحية: ثنائي الببتيديل ببتيديز-4، هرمون محفز الجريب، العقم ، الهرمون اللوتيني، السمنة. تستوستيرون، عامل التنخر الورمي الفا