Research Article
Serum Leptin as a Marker for Severity of Endometriosis

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Background. Endometriosis a disease of theories, and one of the important causes of chronic pelvic pain, dysmenorrhea, dyspareunia, and subfertility. Surgery is the mainstay step for the diagnosis; noninvasive test is the goal in the future. Aim of Study. To test the role of serum leptin in determination of severity of endometriosis. Study Design. A cross-sectional study done in Al-Yarmouk Teaching Hospital from 1st of January 2018 to 1st of January 2019. Methods. 60 BMI-matched patients were involved in the study. A study group of 30 patients were operated either by laparoscopy or laparotomy for many reasons diagnosed as endometriosis by histopathology, and 30 normal women as a control group underwent elective surgery. Blood sample was taken from all patients in the theater room when laparoscopy finding went with endometriosis, and classifying according to surgical staging of endometriosis, the level of serum leptin was measured by ELISA using Human LEP (Leptin) ELISA Kit. The recording of finding of laparoscopy after conforming of diagnosis by histopathology was compared with the result of serum leptin. Result. The result shows no significant difference between the two groups regarding parity and age; however, the level of serum leptin was significantly high in the endometriosis group than in the control group. The P value was less than 0.05. Also, the result shows no significant differences between serum leptin in both groups according to the symptom but there was a significant difference with surgical staging. The mean of the level of serum leptin in stage 1 was 214.8, while it was 340.3 in stage 4. Conclusion. Serum leptin can be used as a marker of severity of endometriosis.

1. Introduction

Endometriosis is an enigmatic disease associated with serious morbidity and change in quality of life among childbearing-age females. Early diagnosis and focus management of the disease were a big challenge for both gynecologists and patients. It is defined as endometrial tissue (stroma and gland) present outside the uterus [1]. Determination of the endometriosis incidence is challenging because some women do not show symptoms; prevalence was estimated to be between 10 and 15 percent of women [2]. Also, with Mullerian abnormality, incidence increased up to 40%. The endometrial tissue may present in any site according to the process of its development and progress such as ovary, peritoneum, bladder, vulva, and scar of operation [3] or in rare sites such as brain tissue [4]. These ectopic tissues remain under the effect of ovarian hormones which cause cyclical change of growth and shedding that lead to wide variation of symptoms due to fibrosis and adhesion formation and infiltration [5].

More than 100 years ago when endometriosis was first described, its nature, progression, and the way by which it was related to infertility and occurrence of pelvic pain remain unclear [6].

The etiology of endometriosis appears to be of multiple theories, including hematological metastasis, immunological changes, abnormal proliferation of the cell and apoptosis, endocrine abnormality, and genetic predisposition (stem cell theory) [7].

There is no specific test for diagnosis of endometriosis. While many markers were evaluated in many research studies for the noninvasive diagnosis of disease, none were revealed to be of great benefit. CA125 concentrations show a high level in patients with endometriosis but they are not specific [8].
Leptin is a 167 amino acid protein with a 21 amino acid signal peptide and a product of ob gene. Leptin is present in the plasma in two forms, free or bound to leptin-binding proteins. This hormone had a role in basal metabolism, reproduction, and food intake. Leptin also had immune-regulatory, proinflammatory, and neoangiogenesis functions, so it may play a role in pathogenesis of endometriosis [9].

2. Patient and Methods

A cross-sectional study was performed in Al-Yarmouk Teaching Hospital (tertiary hospital in Baghdad) from 1st of January 2018 to 1st of January 2019.

60 BMI-matched patients were involved in the study. A study group of 30 patients were operated (laparoscopy or laparotomy for ovarian cyst, chronic pelvic pain, and painful lump at the site of previous scar) and all were diagnosed as endometriosis by histopathology. 30 normal women underwent laparoscopy for other gynecological causes such as sterilization, diagnostic laparoscopy for infertility, and chronic pelvic pain and no endometriosis) as the control group. Verbal consent was obtained from all patients involved in the study.

Inclusion criteria included all patients that had pelvic pain, infertility, dysmenorrhea, dyspareunia, and suspected to be a case of endometriosis and underwent laparoscopy for diagnosis.

Exclusion criteria included pregnant patients, haemodynamically not stable patients, obese patients, and patients with medical disease. Detailed history includes the chief complaint signs and symptoms and medical, surgical, drug, and menstrual history. Blood sample was taken from patients in the theater room when laparoscopy finding went laparoscopy for other gynecological causes such as sterilization, diagnostic laparoscopy for infertility, and chronic pelvic pain and no endometriosis) as the control group. Verbal consent was obtained from all patients involved in the study.

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Table 1: Demographic characteristic features of both groups.

| Age (years) | Endometriosis (30) | Controls (30) | P value |
|-------------|---------------------|---------------|---------|
| <20         | 0 (0.0)             | 2 (6.7)       | 0.031*  |
| 20–24       | 0 (0.0)             | 7 (23.3)      |         |
| 25–29       | 8 (26.7)            | 6 (20.0)      |         |
| 30–34       | 14 (46.7)           | 10 (33.3)     |         |
| ≥35         | 8 (26.7)            | 5 (16.7)      |         |
| Mean ± SD (range) | 32.3 ± 4.4 (25–42) | 29.0 ± 6.6 (16–42) | 0.029# |

Parity

| Parity   | Endometriosis (30) | Controls (30) | P value |
|----------|---------------------|---------------|---------|
| 0        | 8 (26.7)            | 1 (3.3)       | 0.016*  |
| 1–4      | 20 (66.7)           | 22 (73.3)     |         |
| ≥5       | 2 (6.7)             | 7 (23.3)      |         |
| Mean ± SD (range) | 1.7 ± 1.5 (0–6) | 3.0 ± 1.6 (0–6) | 0.002# |

*Significant difference between proportions using Pearson's chi-square test at 0.05 level. #Significant difference between two independent means using Student's-t-test at 0.05 level.

Table 2: Relation between serum leptin and both groups.

| Serum leptin level (pg/ml) | Endometriosis (30) | Controls (30) | P value |
|---------------------------|---------------------|---------------|---------|
| 150                       | 0 (0.0)             | 8 (26.7)      | 0.0001* |
| 200                       | 8 (26.7)            | 17 (56.7)     |         |
| 250                       | 11 (36.7)           | 1 (3.3)       |         |
| 300                       | 5 (16.7)            | 4 (13.3)      |         |
| 350                       | 2 (6.7)             | 0 (0.0)       |         |
| 400                       | 4 (13.3)            | 0 (0.0)       |         |
| Mean ± SD (range) | 289.73 ± 65.08 (201.245–431.479) | 222.66 ± 40.40 (180.492–340.450) | 0.0001# |

*Significant difference between proportions using Pearson's chi-square test at 0.05 level. #Significant difference between two independent means using Student's-t-test at 0.05 level.

Figure 1: Serum leptin curve in both groups. (a) Endometriosis. (b) Controls.
important factors involved in the pathogenesis of endometriosis.

Viganò et al.’s [13] study involved 67 women divided into those proved to have endometriosis and remaining as control. The result revealed no significant difference so it is not a marker for diagnosis of endometriosis or does not detect its severity. This result disagrees with our study.

Osman et al. [14] studied the role of leptin and some other antioxidants in infertile women, with endometriosis blood sample collected from 38 patients, about two thirds of them being in the study group and the others in the control group. It was revealed that there was no important difference in serum leptin concentrations between the studied groups. Again, this study disagrees with our study.

Wertel et al. [15] compared the level of serum and peritoneal level of leptin in different stages of endometriosis in two study groups, fertile and nonfertile, and the study revealed that higher level PF leptin concentration was observed in patients with stages III and IV of endometriosis than in those with the minimal stage of the disease, a similar result from our study in serum leptin level.

Leptin may be used with other markers as combination to predict the severity of endometriosis.

**Data Availability**

The patient data used to support the findings of this study are currently under embargo while the research findings are commercialized. Requests for data 6/12 months after publication of this article will be considered by the corresponding author.

**Ethical Approval**

This article has been approved by the Medical Committee of Obstetrics and Gynecology Department of Al-Yarmouk Teaching Hospital.

**Consent**

Verbal consent has been obtained from all participants before starting this work.

### Table 3: Serum leptin level according to symptoms and surgical staging in group 1.

| Symptoms       | No  | Mean ± SD  |
|----------------|-----|------------|
| Infertility    | 14  | 286.3 ± 60.5 |
| Pelvic pain    | 12  | 279.2 ± 61.2 |
| Others         | 4   | 333.3 ± 91.2 |
| Surgical stage |     |            |
| Stage 1        | 5   | 214.8 ± 15.5 |
| Stage 2        | 4   | 253.4 ± 17.8 |
| Stage 3        | 8   | 272.6 ± 31.5 |
| Stage 4        | 13  | 340.3 ± 61.2 |
| P value        |     | 0.353      |

* Significant difference among more than two independent means using the ANOVA test at 0.05 level.

**Figure 2:** Serum leptin level in relation to surgical staging.
Conflicts of Interest

The authors declare that they have no conflicts of interest.

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