Original Article

Correlation Of Monocyte Chemoattractant Protein-1 With Female Unexplained Infertility

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Abstract

Objective: to contrast the serum MCP-1 concentration between women who have main or secondary unexplained infertility and fertile women (control group). Methods: Case-control research was done using data from November 2021 to March 2022. The study population consisted of 102 females with primary and secondary unexplained infertility and 82 apparently healthy reproductive women (who have at least one child) but are not pregnant. monocyte chemoattractant protein 1 was evaluated using a customized commercial kit developed by the Bioassay Technology Laboratory and quantified by Sandwich Enzyme-Linked Immunosorbent Assay. Results: In this investigation, we discovered that the case group's mean serum MCP-1 concentration was considerably lesser (265.59 156.9 ng/L) than the control group's (358.11 286.1 ng/L), with a p-value of less than (0.05) and, There were no statistically significant variations in the MCP-1 concentration. in relation to primary or secondary infertility and to the duration of the disease in the study groups, Conclusion: we found there is no significance association between the type of infertility on the serum concentration of the MCP-1.

Keywords: Chemokine, Infertility, MCP-1, Unexplained Infertility.

INTRODUCTION

Infertility is a widespread issue in the world and is regarded as one of the biggest problems facing people in their reproductive years. Infertility is the failure to conceive behind a year of continuous sexual activity deprived of any form of protection (1).

Operational distinctions between primary and secondary infertility,Primary infertility is the condition in which a woman is unable to ever have a child, either because she is unable to conceive or because she is unable to carry a pregnancy to a live birth. Infertility that develops later in life after a prior pregnancy is referred to as secondary infertility (2).

According to the International Committee for Monitoring Assisted Reproductive Technologies (ICMART) description, couples with unexplained infertility "have adequate coital frequency, apparently normal testicular function normal semen analysis, genitourinary anatomy, and a normal ejaculate, as well as apparently normal ovarian function(basal body temperature, cervical mucus changes, serum luteinizing hormone (LH) surge or mid-luteal progesterone), normal fallopian tubes tubal patency (hysteronsalpingogram and/or laparoscopy), uterus, cervix, and pelvis (3&4).

Many gynecological illnesses, including endometriosis, polycystic ovarian syndrome (PCOS), and unexplained infertility, may be influenced by cytokines (5).

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A candidate of the C-C chemokine family is the Monocyte Chemoattractant protein-one (MCP-one), also denoted as CCL-2. Chemotactic cytokines, also known as chemokines, are proteins that bind to heparin which are members of a large family of peptides (sixty to one hundred amino acids) that are architecturally similar to cytokines and whose main purpose is making cell transportation in command.

The development of follicles, ovulation, and the formation and death of the corpus luteum may all be influenced by monocyte chemotactic protein-1. In several organs, including the ovary, It controls the movement and invasion of natural killer cells, lymphocytes, basophils, and monocytes. At the time of ovulation, studies have revealed a momentarily high level of MCP-1 in the ovary and follicular fluid (6).The corpus luteum phase's proliferation and reversion may be influenced by MCP-1, follicular growth, ovulation, and all of these processes. (7) Quantities of mcp1 were higher in the follicular fluids and serum of fat ladies having IVF and they were inversely linked with pregnancy rates. (8). The purpose of this research was to compare the serum concentration of MCP-1 among females with main or secondary unexplained infertility to those healthy fertile (control group).

Materials And Methods

This case-control investigation was conducted from November 2021 to March 2022. The study population consisted of 102 females with primary and secondary unexplained infertility that visited the fertility center at the Basra Maternity and Child Hospital and received a gynecological diagnosis. They were 20 to 45 years old on average. Eighty-two apparently healthy reproductive women of similar age to the study group who visited a health care facility or family planning center but were not pregnant and had no gynecological issues.

Fresh venous blood samples of three milliliters (3ml) each were obtained in gel tubes , centrifuged to get the serum, and then kept at (- 20 ℃)for use in an ELISA analysis (9). By using a specialized commercial kit from Bioassay Technology Laboratory (BT, CHINA, SHINGHAI). (aSandwichEnzyme-Linked Immunosorbent Assay), MCP-1 concentrations in serum were calculated. An ELISA reader operating at 450nm was used to measure the results (10).

Statistical analysis

Data was analyzed using SPSS version 25 (Statistical Package of Social Science). To compare percentages, apply the Chi-square (X2). To compare two numerical variables, (Mean SD) and a T-test was utilized to characterize the numerical data.

Results

Characterization of the study population:

This study included a total of 184 female participants, involving 102 patients with unexplained infertility and 82 fertile females as the control group. They ranged in age from 20 to under 50, with a mean (31.5924± SD 6.79216). The distribution of cases and control groups in connection to age, Type, and Duration of infertility was presented in Table (1).

Table 1. Characteristic of study population

Variable		*Cases (102)*		*Control (82)*		*p-value*
		N0	*%*	*No*	*%*	
Age group	20-30	54	52.9	50	61.0	0.478
	>30	27	26.5	20	24.4	
	>40	21	20.6	12	14.6	
Type of infertility	Primary	77	75.5			
	Secondary	25	24.5			
Duration of infertility	<10 years	16	15.7			
	>10 years	86	84.3			

Table 2: Differences in MCP-1 serum concentrations among the study population

Test	*Cases (n=102)*	*Control (n=82)*	*p-value*
	Mean ± SD		
MCP-1 (ng/L)	265.59± 156.9	358.11±286.1	0.006 (H.S)

Table 3: Differences in MCP serum concentrations in relation to the type of infertility

Test	*Primary infertility group (n=77) Mean ± SD*	*Secondary infertility group (n=25)*	*p-value*
MCP-1 (ng/L)	268.2± 177.1	257.6± 66.1	0.771 (N.S)

Table 4. Differences in MCP serum concentration in relation to the interval of infertility

Test	*<10 years*	*>10 years*	*p-value*
	Mean ± SD		
MCP-1 (ng/L)	261.6± 45.6	266.3± 170.0	0.912 (N.S)

No statistically significant variations in the concentration of MCP-1 in linkage to primary or secondary infertility and to the duration of the disease in the study groups, as shown by the association of the quantity of (MCP-1) in the serum with duration of infertility summarized in tables 3 and 4.

Table 5. Association of serum concentration of (MCP-1) with the age study groups

Test	*r*	*P-Value*
MCP-1 (ng/L)	- 0.157	0.033

It was determined whether there was any link of statistical significance between the patients' ages and the mean serum levels of (MCP-1), and the results are shown in Table 5 as a consequence. The MCP-1 correlation was significant (p less than 0.05), and the (r) of (- 0.157) indicated that the blood level of MCP-1 declined as people aged, as seen in Figure (1).

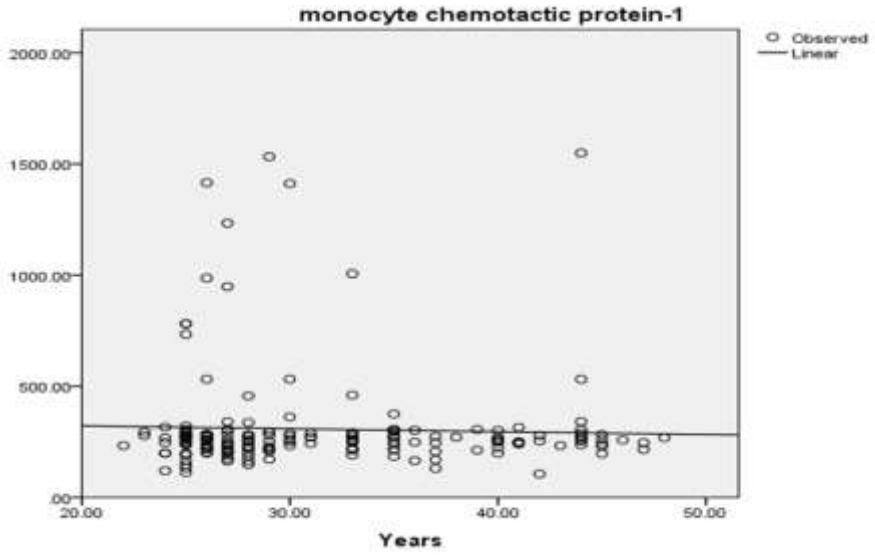

Figure 1: Liner regression line for the correlation between MCP-1 and the age of the study population.

Discussion

The objectives of a diagnostic fertility checkup are establishing the cause, providing a prognosis, and formulating a treatment plan.

Regarding the demographic characteristics of the study subjects, the age of the subjects in this captivating study ranged from 20 to 45 years old with a mean (of 31.5924 SD 6.79216). And the highest frequency of infertile females belongs to the first age group, which is consistent with the information provided by (11) who claimed that the majority of women (57.2%) were in the 20–30 age range with a mean age of 29–6 years.

Regarding the distinction between primary and secondary infertility Primary infertility affected 75.5% of the individuals studied, whereas other type infertility affected 24.5% of them, Thus according (12,11), (78.7%) of those diagnosed with initial infertility and (21.3%) of those with secondary infertility had secondary infertility.

In addition, Masoumi et al. (13) stated that (69.5%) suffered from primary infertility and (30.5%) suffered from secondary infertility However, Orhue and Aziken (14) reported the opposite conclusion, stating that the infertility was primary in 14.3% of cases and secondary in 85.7%. Monocyte-chemotactic protein-1 is crucial for immune response, angiogenesis, and the consequence of pregnancy. It has been linked to the biological processes involved in embryo implantation, pregnancy maintenance or failure, preterm and term labor, preterm premature membrane rupture, preterm chorioamnionitis, and the pathogenesis of endometriosis (15).

In this investigation, we discovered that the case group's mean serum MCP-1 concentration was substantially lower (265.59 156.9 ng/L) than the control (358.11 286.1 ng/L), with a p-value of (0.05). This conclusion is in line with what reported by Trunov et al. (16). These results were incompatible with Younis et al. (17) who claimed that women with Unaccounted-for infertility do not have a change in the blood level of MCP-1. and reject both the findings of several authors worldwide (18,19). While MCP-1 serum concentration and follicular fluid of fatty females undergoing IVF were found to be elevated and inversely linked with pregnancy rates (20).

MCP-1 and its receptor C-C Chemokine Receptor Type 2 (CCR2) are located in the ovaries, where MCP-1 plays a physiological role in normal ovulation by attracting monocytes from blood arteries into the ovaries, according to Dahm-Kähler et al. (21). Bouet et al. (22) have demonstrated a momentary rise in MCP-1 levels in the FF and ovarian stroma during ovulation. This may suggest that because MCP-1 has been linked to follicular development, ovulation, corpus luteum development, and regression. By altering the maturation of oocytes, the low serum concentration of MCP-1 in UI females may contribute to the etiology of their illness and may serve as a target for immunological treatment (22).

Human chorionic gonadotropin (hCG) has been shown in studies by Asemota et al. (23, 24) to boost MCP-1 synthesis in rat ovaries by eighteen times. However, MCP-1 may also control trophoblast invasion into the placental bed and may have an impact on placental growth and function by acting through decidual and fetal macrophages. Based on these facts, we can hypothesize that low levels of MCP-1 play an important role in UI (25).

Nevertheless, Because of its helpful chemotactic properties, MCP-1 may potentially contribute to the initiation of pregnancy. Macrophages emit anti-inflammatory cytokines and stop decidua from releasing self- and paternal alloantigens by apoptosis. Furthermore, there is a strong suggestion that natural killer cells, in addition to cytokines that act close by, are crucial in the initial establishing or refusal of trophoblastic tissue upon implantation and in the first trimester of pregnancy. The endometrium is filled with CD56+ NK cells that had the CCR2 receptor and chemotact for MCP-1.

In demand to answer the question of whether the type (primary or secondary) and the duration of infertility have any effect on the mean serum levels of MCP-1 parameter in this study, we establish there is no significant association between the type of infertility on the serum concentration of the MCP-1.

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