

# The Association between Female Infertility and Catalase Enzyme in Karbala Province of Iraq

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## ABSTRACT

**Background:** One of the most significant and overlooked conceptive medical issues in non-industrial nations is the high pace of subfertility and childlessness. There is developing proof of the conceivable function of profoundly responsive results of oxygen-related agents like catalase enzyme in female subfertility.

**Aim of the study:** To confirm this objective, the level of catalase chemical (CAT) and its connection with certain components (age, weight record, smoking, infertility duration and type of infertility) were surveyed.

**Method:** This case control study included 100 subfertile ladies distinguished from the fertility clinic information base in maternity clinic and private facility contrasted and 100 fertile ladies. Detailed history and assessment were done, and the blood tests were moved to the biochemical lab to examine CAT as searching compounds by enzyme-linked immunosorbent assay (ELIZA) pack.

**Results:** The catalase levels of infertile women show a significant decrease ( $p < 0.05$ ) when compared with the fertile control. Its shows an insignificant negative Correlation with age, BMI and duration of subfertility ( $p > 0.05$ )

**Conclusion:** Catalase was significantly decreased in patients with subfertility, and had inverse insignificant relationship between its level and duration of subfertility increment in patients with subfertility

**Keywords:** Catalase enzyme, Female infertility, Subfertility.

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## INTRODUCTION

One of the most significant and overlooked conceptive medical issues in non-industrial nations is the high rate of subfertility.<sup>1</sup> Infertility is characterized as ‘the failure to consider following a year of unprotected sex.’<sup>2</sup> Primary type is delegated essential in which no past pregnancy has happened and secondary type in which earlier pregnancy has happened particular of its result.<sup>3</sup> Reasons for subfertility can be found in about 90% of cases, around 10% of patients don’t have cause is called unexplained subfertility.<sup>4</sup> Since female ovary is the wellspring of oocytes and directing hormones, free radicals in the gynecologic climate is probably going to be a significant arbiter of origination. As of late there is a developing proof of conceivable function of exceptionally receptive results of oxygen, named free radicals, in subfertility.<sup>5</sup> A free radical is any molecule (for example, oxygen, nitrogen) with in any event one unpaired electron in the furthest shell.<sup>1</sup> Free revolutionary are killed by a detailed cancer prevention agent guard framework. In a solid body, supportive of oxidants and cell reinforcements

keep up a proportion and a move in this proportion towards favorable to oxidants offers to ascend to oxidative stress.<sup>6</sup> For this situation free extreme species which are precarious and exceptionally responsive, will get steady by securing electrons from nucleic acids, lipids, proteins, starches or any close by particle, causing a course of chain responses bringing about cell harm and sickness.<sup>7</sup> Since free revolutionaries are flimsy and hard to gauge, conventional records of oxidative pressure include measure of cell reinforcements like catalase protein which exceptionally proficiently catalyzes the decay of  $H_2O_2$  into  $H_2O$  and  $O_2$ .  $H_2O_2$  furthermore stands apart as one of the receptive oxygen species (ROS) identified with oxidative pressure, a cycle firmly identified with maturing and a few wellbeing issues or illnesses like female subfertility.<sup>8</sup>

## METHODS

This study was case-control study, which included 100 subfertile ladies were distinguished from the fertility clinic information base in maternity medical clinic and private

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**Table 1:** Sociodemographic data of studied groups

Variables	Groups	Patients		Control		p value
		(n=100)	%	(n=100)	%	
Age years	< 20	7	7	5	5	>0.05
	20–29	33	33	45	45	
	30–39	58	58	49	49	
	40–49	2	2	1	1	
Type of infertility	Primary	41	41	-	-	-
	Secondary	59	59	-	-	
Occupation	Homemaker	72	72	66	66	>0.05
	Employed	28	28	34	34	
Duration of infertility (years)	< 5	51	51	-	-	-
	5–9	37	37	-	-	
	10–20	12	12	-	-	
	Underweight	5	5	4	4	
BMI	Normal	59	59	62	62	>0.05
	Overweight	28	28	30	30	
	Obese	8	8	4	4	
Address	Rural	27	27	15	15	>0.05
	Urban	73	73	85	85	
Smoker	Passive	32	32	27	27	>0.05
	Non	68	68	72	72	

p < 0.05 was statistically significant

**Table 2:** The catalase levels in the studied groups

K/mL	Patients	Control	p value
Serum catalase	0.34 ± 0.28	0.48 ± 0.34	<0.05

p < 0.05 was statistically significant

**Table 4:** catalase level according to smoking habit and type of infertility

Patients		Mean ± SD	p value
Smoking habit	Smoker	0.32 ± 0.04	<0.05
	Non smoker	0.30 ± 0.14	
Types of infertility	Primary	0.31 ± 0.24	<0.05
	Secondary	0.28 ± 0.31	

p value < 0.05 was statistically significant

center contrasted and 100 fertile ladies. The patients were seen between August 2018 and May 2019. The sum total of what ladies had been examined, with a mean old age (29.566 ± 6.195 years), and from 18 to 44 years. Those having male factor of barrenness or whatever other a related condition which could adjust the degree of free extremists like, hypertension, diabetes mellitus, coronary illness, threat, and cell reinforcement treatment, had been avoided from the examination. Each subject was included to point-by-point clinical history and actual assessment. The subfertile group had undergone baseline investigations of infertility. The blood tests were moved to the biochemical research facility for investigation of CAT as searching proteins by ELIZA pack. SPSS program was utilized in this study. All values were communicated as mean ± standard deviation (SD). Independent t-test was used

**Table 3:** Correlation between catalase level and age BMI and duration of infertility

Serum catalase		Patients	Control
Age	r	-0.12	-0.03
	P	0.78	0.55
BMI	r	-0.19	-0.09
	P	0.49	0.9
Duration of infertility	r	-0.1	-
	P	0.81	-

p < 0.05 was statistically significant

to estimate differences between groups. The differences were considered significant when the probability (P) was less than 0.05 (p > 0.05).<sup>9</sup>

## RESULTS

The demographic data of studied group are shown in Table 1. There was an insignificant difference between patients and control in age, BMI, occupation and address (p > 0.05).

The catalase levels of infertile women show a significant decrease (p < 0.05) when compared with fertile control, as shown in Table 2.

The catalase level in of infertile women shows an insignificant negative correlation (p > 0.05) with age increment as shown in Table 3. Also show an insignificant negative correlation (p > 0.05) with body mass index. The catalase levels also show an insignificant negative correlation (p > 0.05) with duration of infertility.

The catalase levels shows insignificant differences between primary and secondary infertility ( $p > 0.05$ ).

## DISCUSSION

Catalase level in infertile women show a significant decrease ( $p < 0.05$ ) when compared with fertile controls. This result agrees with the results of Pyari, *et al.* who find that CAT level is significantly low in endometrium and blood of infertile women compared to those in controls.<sup>10</sup> Similarly, Polak, *et al.* find that the total antioxidant status is significantly lower in peritoneal fluid from women with infertility.<sup>11</sup> Catalase is an enzymatic antioxidant; located mainly in the tubal fluid. Neutralizes intracellular and extracellular hydrogen peroxide.<sup>12</sup> Higher ROS levels in patients with infertility may lead to increase ROS-scavenging process which ultimately lead to reduce levels of antioxidants such as catalase enzyme. Catalase promotes an increase in the proportion of zygotes undergoing at least one cleavage.<sup>12</sup> So any change in its concentration may lead to disruption of zygotes cleavage which leads to infertility. Ali *et al.* show that the usage of catalase in media of *in-vitro* fertilization gives better quality embryos.<sup>13</sup> Catalase levels of infertile women show insignificant differences ( $p > 0.05$ ) between primary and secondary infertility. This result disagrees with the results obtained by Pyari, *et al.* who find that catalase levels in the endometrial biopsy and blood are significantly higher in women with secondary infertility compared to those with primary infertility.<sup>10</sup> This result may be due to affect of catalase level by other factors such as age, BMI, free radical production, environmental conditions and antioxidant dietary supplementation. Catalase levels show insignificant differences ( $p > 0.05$ ) between passive and not a smoker in infertile women. Hence the duration of exposure to smoke, degree of air ventilation and other environmental factors may lead to such results. Catalase levels show an insignificant negative correlation with age increment compared with fertile controls. As in the study of Carbone *et al.*, who find that the specific activity of catalase is lower in older women compared with the younger ones.<sup>14</sup> This means that the free radicals increase with age, leading to decreased levels of antioxidants.

## CONCLUSION

Catalase levels show an insignificant negative correlation with BMI increment when compared with fertile controls. This result may be due to the increasing level of polyunsaturated lipid with BMI increment which leads to increase free radical and decrease antioxidant levels. Catalase levels show an insignificant negative correlation with duration of infertility. This result matches with the results obtained by Jackson, *et al.* who find that there is no statistically significant associations between serum catalase level and time to get pregnancy.<sup>15</sup>

Catalase is an enzymatic antioxidant; located mainly in the tubal fluid. Neutralizes intracellular and extracellular hydrogen peroxide decreases its level, lead to increase free radicals level and increases the probability of sperm and ova damage which ultimately lead to increase duration of infertility.

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