

RELATIONSHIP BETWEEN SERUM
TESTOSTERONE LEVELS AND SEMINAL PLASMA
MAGNESIUM AND ZINC LEVEL IN INFERTILE
MEN WITH ASTHENOSPERMIA

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Abstract
Background: Many factors are affect negatively on male fertility one of them the chemical substances like Zinc and magnesium which may affect on testosterone level .The aim of this study is to measure the level of zinc and copper in seminal plasma of infertile men with asthenospermia and their relation to testosterone level .
Methods: A sample of 100 men was involved in the study (50 infertile men with asthenospermia and 50 fertile men). The level of seminal plasma Zn and Mg in was measured by atomic absorption spectrophotometry . Fluorecare, China Testosterone Kit was used to measure Testosterone level.
Results: the serum testosterone level in studied group was messured , the group with asthenospermia had lower testosterone level than group with normospermia (p<0.001). The fertile male had higher Mg level than patients with asthenospermia (p<0.001).Also , the male with normospermia had higher zinc level than patients with asthenospermia (p<0.001). A strong positive correlation was found between testosterone levels and magnesium levels. Additionally, there was a significant positive correlation between testosterone levels and zinc levels (p>0.05).ROC curve was done , Zn had higher area under the curve , cut of value of 30 ppm give a sensitivity 95% and specificity 93% followed by Mg , cut of value of 25 give a sensitivity 92% and specificity 90%.So both Zn and mg affect on sperm activity , lower level associated with asthenospermia
Conclusion: Zn and Mg in seminal plasma may effect on sperm activity and positively related with testosterone level and may help in explore the cause and treatment of infertile males.
Keywords: Zinc, magnesium, male infertility, seminal plasma

Introduction
Subfertility is a major health problem ; It affect Around 8-12% of couples experience infertility, with male factors accounting for approximately 30-40% of cases in subfertile couples [1]. Asthenozoospermia is a condition characterized by reduced sperm [1].Many factors affect on male fertility by affecting on spermatozoa agenesis, transport , germinal cells , Blood vessels , nutritional , immunological or any factors affect on spermatozoa quantity and quality and finally the male fertility potential [2]. One of these factors which affect on male reproductive function is trace elements because they had a testicular development and spermatogenesis are significantly influenced by an important role. at the molecular level . Prostate gland excreted Zinc (Zn); thus, its level in seminal plasma usually represent secretary function of prostate[3]. Zinc had many roles on male reproductive function , it inter in the oxidation reduction process Additionally, it may have a regulatory function in the processes of capacitation and the acrosome reaction .Magnesium (Mg) have been connected with male fertility potential and low levels of Mg had been observed in patients with oligospermia, asthenospermia and prostatitis [4]. Trace elements act as cofactors for different enzymes and affected on semen quality in rodents and humans and connect with oxidation reduction process and affect on sperm quality and finally on male fertility potential [5]. Testosterone is a key male hormone. It can have a direct impact on fertility by decreasing sperm production and an indirect impact by lowering sex drive and causing erectile dysfunction.

Material and Method
The research involved 100 adult males (50 fertile and 50 infertile with asthenospermia) between the ages of 20-50 who visited a private clinic. Samples were collected after abstaining for 3-5 days, with semen collected through masturbation. The seminal plasma was then separated from the spermatozoa through centrifugation at 3000 r.p.m for 10 minutes, stored in labeled tubes at -20°C until analysis. The samples were assessed according to World Health Organization guidelines. Measurements of Mg and Zn in the seminal plasma were conducted using electrothermal atomic absorption spectrometry, while testosterone levels were measured using the Fluorecare, China Testosterone Kit. Statistical analysis was carried out using SPSS with a significance level of p < 0.05.

Results
The serum testosterone level in the group with asthenospermia is displayed in Table 1. had lower testosterone level than group with normospermia (p<0.001)

Table 1: serum testosterone level in studied group

Hormones	Normospermia	Asthenospermia	P value
Testosterone (ng/mL)	6.08±1.19	3.86±1.38	0.013*

“*”P value <0.05 is significant

Table (2) shows the Mg and zinc level in seminal plasma , the male with normal SFA had higher Mg level than patients with Table (2). Levels of magnesium and zinc in the seminal plasma of males with normospermia and patients with asthenospermia.

Menials	asthenospermia	Normospermia	P value
Magnesium ppm	29.89±2.91	46.71±6.06	<0.01*
Zinc ppm	36.23±8.222	51.33±9.32	<0.01*

“*P value <0.05 is significant”

The correlation between testosterone level and Mg level, as well as zinc level, is presented in Table (3). A significant positive correlation was observed between testosterone level and Mg level. Additionally, a significant positive correlation was found between testosterone level and zinc level ($p>0.05$).

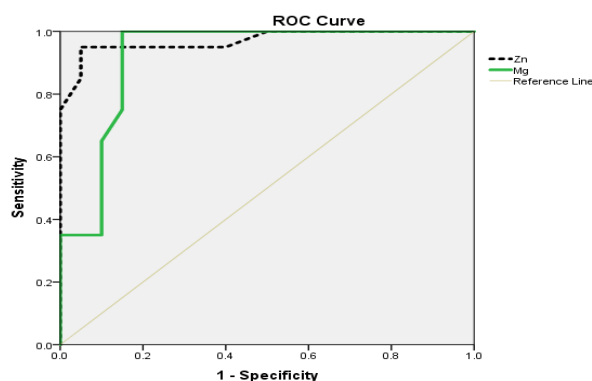
Table (3):Relationship between testosterone level with Mg level and zinc level

Menials	testosterone level	
	r	p value
Magnesium ppm	0.468	0.013*
Zinc ppm	0.376	0.022*

*p value <0.05 was significant

r,Pearson Correlation

ROC curve was done , Zn had higher area under the curve , cut of value of 30 ppm give a sensitivity 95% and specificity 93% fallowed by Mg , cut of value of 25 give a sensitivity 92% and specificity 90%.So both Zn and mg affect on sperm activity , lower level associated with asthenospermia .As shown in figure 1



Elemen ts	Area	Cut of valu e	Sensiti vity	Specific ity	CI 95%	
					Minimu m value	Maximum value
Zn	0.970	30	95%	93%	0.921	1.000
Mg	0.920	25	92%	90%	0.826	1.000

Figure 1: ROC curve for men with asthenospermia against normospermia in studied group.

Discussion

In our study, serum testosterone level was measured in studied group , the group with asthenospermia had lower testosterone

asthenospermia ($p<0.001$).Also , the male with normal SFA had higher zinc level than patients with asthenospermia ($p<0.001$). level than group with normospermia. The findings of Gangwar et al. 2020 support this result. However, other authors did not find a significant difference in the mean serum testosterone levels between infertile cases and fertile controls[9].The patients with normal SFA had higher Mg level than abnormal on ($p<0.001$).

The results of previous studies about Seminal Mg concentration were contradictory . Some studies shows that abnormal sperm and infection associated with low level of Mg [10], while others studies shows insignificant association with poor SFA results. Infertile male had benefit from Mg treatment by improving sperm motility and density [10].Regarding Zn concentration , the patients with normal SFA had higher Zn level than abnormal SFA results ($p<0.001$). This results agree with some researchers how found that zinc levels were low in seminal fluids of infertile men. [11]. Increase Zn level more than ideal concentration associated with The decrease sperm motility grade I , but not on the percentage of total motile spermatozoa [12].Many studies were done with conflicting results , in which high Zn level affects positively, negatively or no effect on sperm quality. [10]. the correlation between testosterone level with Mg level and zinc level . A strong positive correlation was observed between testosterone and zinc levels ($p>0.05$). This finding is supported by previous research indicating that Zinc deficiency can cause damage to testicular structure and hinder testosterone production through oxidative stress and autophagy. This can have negative effects on the proper development of male reproductive organs, sperm production, and fertilization[13].A strong positive correlation was observed between testosterone levels and Mg levels, which aligns with the findings of a study conducted by Aggio et al. (year) that reported a positive association between magnesium and total testosterone[14].ROC curve was done , Zn had higher area under the curve , cut of value of 30 ppm give a sensitivity 95% and specificity 93% fallowed by Mg , cut of value of 25 give a sensitivity 92% and specificity 90%.So both Zn and mg affect on sperm activity , lower level associated with asthenospermia .Mirnamniha and colleagues found that human semen contains various trace elements like copper, zinc, calcium, sodium, potassium, manganese, and magnesium, which play a crucial role in spermatogenesis, sperm maturation, motility, capacitation, and overall sperm function. While these elements are necessary for fertilization, elevated levels of certain metals like manganese and copper can be harmful to sperm and are linked to lower sperm quality. On the other hand, insufficient levels of trace elements can have a negative impact on reproductive health, semen quality, sperm function, and ultimately male fertility [15].

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