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Effect Zinc sulfate on improvement of spermogram parameters

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KEYWORDS

Spermogram, Zinc sulfate, improvement

A B S T R A C T

The number of sperms in men of today is much lower than that of men of 50 years ago. Male infertility can be the result of different changes made in their reproductive health. Problems with the production, maturity, motion and fertility of sperms are among the major causes of male infertility. According to the reports, the Zinc antioxidant contributes to inhibition of the destructive effects of free radicals in testicles and sperms in the male reproductive system. The aim of this study was to analyze the role of Zinc in the improvement of spermogram parameters in men with abnormal spermogram. In a clinical trial on patients with semen abnormalities, the role of prescribed Zinc in the enhancement of semen parameters was examined. The samples were divided into 2 groups. One group received 220 mg/day of the Zinc sulfate supplement. The control group was also treated with placebo. After 3 months of treatment, patients were once again exposed to spermogram examinations in the same laboratory and the following results were obtained. In this study 120 patients with abnormal spermogram results were selected. The mean age of patients in the experimental group and the control group was 30.6±7.9 years and 29.8±3.6 years, respectively (P=0.774). The mean number of sperms prior to the treatment in the experimental and control groups was 11.50±3.37 million and 10.30±4.69 million, respectively (P=0.520). The mean number of sperms following the treatment was 21.50±5.29 million and 12.50±4.24 million sperms for the experimental and control groups, respectively. The mean number of sperms in the experimental group (treated using Zinc sulfate) was significantly larger than that of the control group (P=0.001). A significant increase was observed in the number sperms of patients in the experimental group following the treatment (P<0.001). Although there was a significant increase in the number of sperms in the control group patients (10±4.71), the increase observed in the control group was higher (2.2±2.48).

Introduction

The number of sperms in men of today is much lower than that of men of 50 years ago (1). Hence, male infertility is among the problems of modern societies, especially in the members of industrial societies. Male infertility can be the result of different

changes made in their reproductive health. Problems with the production, maturity, motion and fertility of sperms are among the major causes of male infertility (2).

Zinc is a strong non-enzymatic anti-oxidant capable of hindering the lipid peroxidation reactions in cellular membranes by limiting the function of free radicals. Therefore, it can protect cellular membranes against the damage induced by the reactions (3). According to the reports, the Zinc antioxidant contributes to inhibition of the destructive effects of free radicals in testicles (4) and sperms (5-6) in the male reproductive system. In addition, Zinc is able to reinforce the antioxidant defense system of testicle cells and sperms (7).

The aim of this study was to analyze the role of Zinc Sulphate in the improvement of spermogram parameters in men with abnormal spermogram.

Materials and Methods

In a clinical trial on patients with semen abnormalities, the role of prescribed Zinc in the enhancement of semen parameters was examined.

For this purpose, 120 patients with semen abnormalities were selected. The samples were divided into two groups and patient in the control group were treated with Zinc supplement for 3 months. The control group was also treated with placebo. At the end of the 3-month period, patients were exposed to spermogram to study the variations of semen parameter in the two groups.

Ethical considerations

First of all, the research purposes and its subject were explained to the patients. The patients' questions - which were in relation to this study - were answered. The informed written consent was obtained from patients after explaining and answering their questions.

The patients were assured that their personal information secret and is not mentioned anywhere and they are completely preserved during the study. All information obtained from patient is confidentiality maintained and they will not be used, except for evaluation of results. These were communicated to the patient so their privacy was preserved. All information, tips and recommendations were provided to all patients at baseline and also further information and advises were available as needed for the patients during the study and thereafter. No costs were paid by the patients for check of spermogram.

Statistical Analysis

The collected data were analyzed by SPSS-17 statistical software. The collected data were expressed as percentage and mean ± SD. Continuous (quantitative) variables were compared by Independent samples and Paired t test.

Categorical (qualitative) variables were compared by contingency tables and Chi-square test or Fisher's exact test. P-value < 0.05 was considered statistically significant.

Results

In this study 120 patients with abnormal spermogram results were selected. The samples were divided into 2 groups. One group received 220 mg/day of the Zinc sulfate supplement. The control group was also treated with placebo. After 3 months of treatment, patients were once again exposed to spermogram examinations in the same laboratory and the following results were obtained.

The mean age of patients in the experimental group and the control group was 30.6±7.9 years and 29.8±3.6 years, respectively. There was no significant difference between the mean age of patients in the two groups (P=0.774).

The mean number of sperms prior to the treatment in the experimental and control groups was 11.50±3.37 million and 10.30±4.69 million, respectively. No significant difference was also observed between the numbers of sperms in the two groups before the treatment (P=0.520).

The mean number of sperms following the treatment was 21.50±5.29 million and 12.50±4.24 million sperms for the experimental and control groups, respectively. The mean number of sperms in the experimental group (treated using Zinc sulfate) was significantly larger than that of the control group (P=0.001).

A significant increase was observed in the number sperms of patients in the experimental group following the treatment (P<0.001). Although there was a significant increase in the number of sperms in the control group patients (10±4.71), the increase observed in the control group was higher (2.2±2.48).

Results of spermogram of patient at before of study between tow groups were shown in Table I. Results of spermogram of patient at after of study between tow groups were shown in Table II. Results of spermogram of patient at case group at before and after of study were shown in Table III. Results of spermogram of patient at control group at before and after of study were shown Table IV.

Distribution of Sperm Count of patients at before and after of study between two groups were shown in chart I & II. Distribution of Motile Sperm Count of patients at before and after of study between two groups were shown in chart III & IV.

Discussion and Conclusion

Infertility is the inability to give birth to children after one year of sexual intercourse without the use of contraception methods (8).

About 10 to 18% of young couples suffer from infertility and the cause of half of the infertilities is male infertility. Male infertility can be caused by different factors such as genetic mutations, chromosomal abnormalities, infectious diseases, tract obstruction, varicocele, radiation, chemotherapy, etc. However, about 50% of infertile male are considered idiopathic (8).
In fact, it is assumed that Selenium and Zinc of testicles directly affect sperm structure in leydig cells (9). In addition, the presence of Zinc in different parts of testicles (10) influences qualitative parameters of semen and male infertility.

Seemingly, the concentration of these elements on semen plasma cannot have a considerable contribution to this condition.
It was indicated that different rare elements are necessary for the growth of testicles and production of sperms.

Elements such as Zinc, selenium, magnesium, and copper play a vital role in the parameters of semen. Zinc plays a specific role in Superoxide Dismutase activity and is necessary for the functionality of this enzyme and its antioxidant role.

Most evidence suggests that there is a link between semen parameters and scarcity of such elements (11).

Table.I Results of spermogram of patient at before of study between tow groups

	Group		P
	Case	Control	
Sperm Count	11.50 ± 3.37	10.30 ± 4.69	0.520
Normal Morphology	35.00 ± 11.06	36.00 ± 11.97	0.848
Abnormal Forms	65.00 ± 11.06	64.00 ± 11.97	0.848
Double head	14.50 ± 4.97	16.00 ± 6.58	0.572
Round Head	18.50 ± 6.26	21.00 ± 6.58	0.396
Giant Head	14.50 ± 4.97	13.50 ± 5.80	0.684
Pin Head	15.50 ± 6.43	12.00 ± 4.22	0.167
Motile Sperm	39.50 ± 16.57	38.00 ± 17.35	0.846
Immotile Sperm	60.50 ± 16.57	62.00 ± 17.35	0.846
Rapid Forward Progressive	7.75 ± 2.99	7.75 ± 3.81	1
Slow progressive	14.25 ± 7.27	12.25 ± 7.50	0.552
Slow Progressive with lateral Motion	20.50 ± 5.99	18.00 ± 7.89	0.435
Non Progressive	59.00 ± 14.10	62.00 ± 17.35	0.676

Table.II Results of spermogram of patient at after of study between tow groups

	Group		P
	Case	Control	
Sperm Count	52.00 ± 13.58	39.00 ± 11.25	0.001
Normal Morphology	48.00 ± 13.58	64.00 ± 11.97	0.032
Abnormal Forms	10.50 ± 4.38	17.50 ± 5.89	0.012
Double head	13.50 ± 6.26	20.00 ± 6.24	0.007
Round Head	11.00 ± 6.15	14.00 ± 5.16	0.032
Giant Head	13.00 ± 7.53	12.50 ± 3.54	0.253
Pin Head	64.50 ± 16.57	40.00 ± 17.64	0.851
Motile Sperm	35.50 ± 16.57	60.00 ± 17.64	0.005
Immotile Sperm	16.00 ± 3.16	14.50 ± 5.50	0.005
Rapid Forward Progressive	19.00 ± 6.15	15.00 ± 6.67	0.464
Slow progressive	24.00 ± 4.59	20.00 ± 6.24	0.180
Slow Progressive with lateral Motion	41.00 ± 10.75	50.50 ± 13.01	0.120
Non Progressive	21.50 ± 5.30	12.50 ± 4.25	0.092

Table.III Results of spermogram of patient at case group at before and after of study

	Time		P
	Before	After	
Sperm Count	11.50 ± 3.37	21.50 ± 5.30	<0.001
Normal Morphology	35.00 ± 11.06	52.00 ± 13.58	<0.001
Abnormal Forms	65.00 ± 11.06	48.00 ± 13.58	<0.001
Double head	14.50 ± 4.97	10.50 ± 4.38	<0.001
Round Head	18.50 ± 6.26	13.50 ± 6.26	<0.001
Giant Head	14.50 ± 4.97	11.00 ± 6.15	0.001
Pin Head	15.50 ± 6.43	13.00 ± 7.53	0.015
Motile Sperm	39.50 ± 16.57	64.50 ± 16.57	<0.001
Immotile Sperm	60.50 ± 16.57	35.50 ± 16.57	<0.001
Rapid Forward Progressive	7.75 ± 2.99	16.00 ± 3.16	<0.001
Slow progressive	14.25 ± 7.27	19.00 ± 6.15	<0.001
Slow Progressive with lateral Motion	20.50 ± 5.99	24.00 ± 4.59	0.001
Non Progressive	59.00 ± 14.10	41.00 ± 10.75	<0.001

Table.IV Results of spermogram of patient at control group at before and after of study

	Time		P
	Before	After	
Sperm Count	10.30 ± 4.69	12.50 ± 4.25	0.021
Normal Morphology	36.00 ± 11.97	39.00 ± 11.25	0.005
Abnormal Forms	64.00 ± 11.97	64.00 ± 11.97	0.015
Double head	16.00 ± 6.58	17.50 ± 5.89	0.193
Round Head	21.00 ± 6.58	20.00 ± 6.24	0.168
Giant Head	13.50 ± 5.80	14.00 ± 5.16	0.726
Pin Head	12.00 ± 4.22	12.50 ± 3.54	0.591
Motile Sperm	38.00 ± 17.35	40.00 ± 17.64	0.037
Immotile Sperm	62.00 ± 17.35	60.00 ± 17.64	0.037
Rapid Forward Progressive	7.75 ± 3.81	14.50 ± 5.50	0.008
Slow progressive	12.25 ± 7.50	15.00 ± 6.67	0.007
Slow Progressive with lateral Motion	18.00 ± 7.89	20.00 ± 6.24	0.037
Non Progressive	62.00 ± 17.35	50.50 ± 13.01	0.003

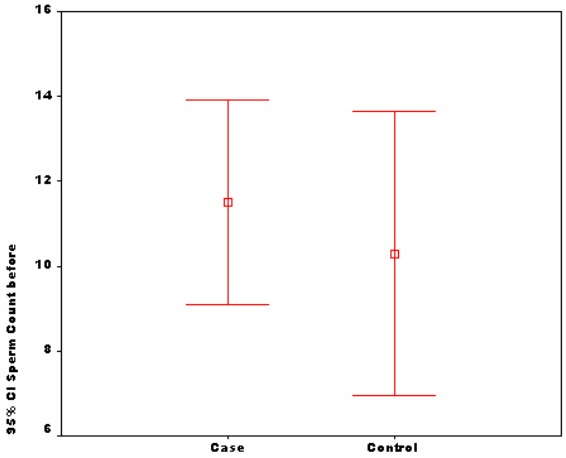

Chart.I Distribution of Sperm Count of patients at before of study between two groups

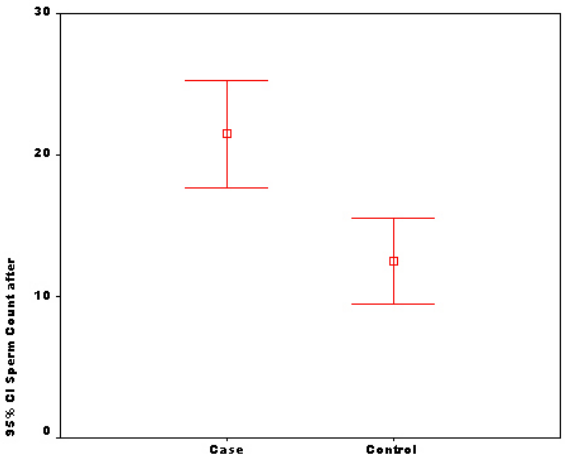

Chart.II Distribution of Sperm Count of patients at after of study between two groups

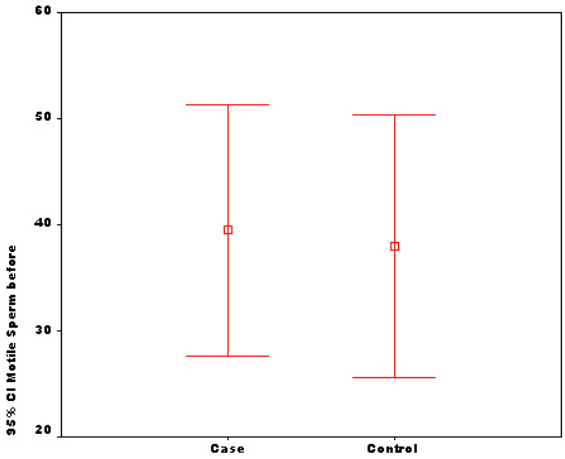

Chart.III Distribution of Motile Sperm Count of patients at before of study between two groups

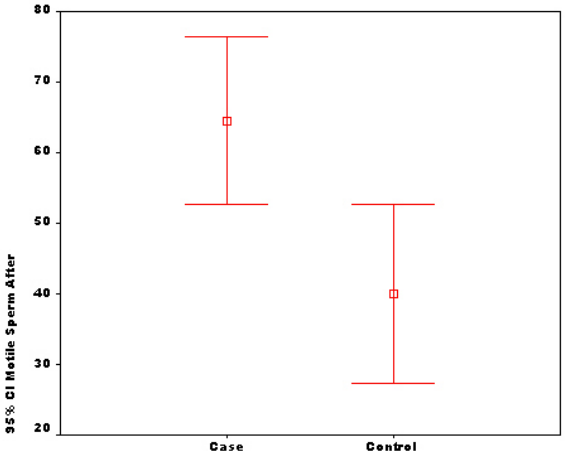

Chart.IV Distribution of Motile Sperm Count of patients at after of study between two groups

It was indicated that this element is necessary for production of sperm (10).
Zinc is an element necessary for stability of semen plasma, membrane, and sperm chromatin and inhibits analysis of these elements (11).

It seems this element acts as a potential cleanser of superoxide anions produced by sperms and white blood cells (12). Hence, it seems that semen plasma plays the role of a semi-antioxidant agent in facing with superoxide anion.

Ebisch and et al show that folic acid and Zinc Sulphate was effective in increase of sperm concentration in patients with abnormal spermogram (13).

In our study, A significant increase was observed in the number sperms of patients in the experimental group following the treatment ($P<0.001$). Although there was a significant increase in the number of sperms in the control group patients (10 ± 4.71), the increase observed in the control group was higher (2.2 ± 2.48).

Wong and et al demonstrated that total normal sperm count increases after combined Zinc sulfate and folic acid treatment (14).

Tikkiwal and et al show that Zinc supplement has potential effect on sperm count and male infertility (15).

Kynaston and et al show that oral Zinc Sulphate has significant improvement in the percentage progressive and total sperm motility was noted accompanied by a significant increase in seminal fluid Zinc levels (16).

Azizollahi and et al demonstrated that co-administration of Zinc and folic acid significantly improved sperm parameters and increased varicocelectomy outcomes (17).

Results of our study demonstrated that use of Zinc Sulphate has effective in improvement in the percentage progressive and total sperm motility and also sperm count.

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