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Role of Antioxidant Supplements in Idiopathic Male Infertility in Erbil City

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Abstract

Background: Fertil Aid for Men is a non-prescription dietary supplement, it's a mixture of multiple antioxidants, vitamins, a blend of herbal ingredients, and amino acid, as L-Carnitine. This research aims to appraise the effectiveness of a mixture of vitamins and antioxidants on seminal fluid parameters in males with idiopathic infertility.

Method: Thirty-three men with idiopathic infertility were involved inthis prospective clinical study. The baseline semen specimens were taken from the subjects following three to seven days' abstinence. Semen parameters including (volume, pH, concentration, and motility) were measured. Abnormal sperm sample subjects were given a FertilAid capsule three times daily for 90 days then final semen analysis was estimated.

The outcomes of this study demonstrated consumption of fertilAid has significantly improved sperm count/ml ($p < 0.05$), also significant amelioration in the sperm motility including progressive and non-progressive motility ($p < 0.05$). The rate of total sperm motility was significantly improved ($p < 0.05$).The concentration of immotile sperm has considerablyreduced ($p < 0.05$).

Conclusion: The administration of a combination of L-Carnitine, Zinc, Maca Root, Asian Ginseng, Vitamin C, E, Beta Carotene, and Selenium PLUS CoQ10 in idiopathic male infertility has notably improved sperm parameters.

Keywords: Antioxidants; FertilAid; Seminal fluid analysis; Sperm motility; Progressive motility.

Introduction

The worldwide incidence of infertility is about 15% (1) and is described as the failure of a couple to conceive after one year of regular, unprotected sex.[2,3]

Semen interpretation determines and describes the following deteriorations in males: oligozoospermia (reduced sperm concentration), asthenospermia (decreased sperm motility), teratozoospermia (sperms with atypical morphology), and the combination of all of them OAT (oligoasthenoteratozoospermia).[4] Almost 30% of OAT cases are recognized as Idiopathic Oligoasthenoteratozoospermia (IOAT).[5]

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Seminal vesicles and prostate glands secrete plasma consisting of some elements that provide care for spermatozoa during ejaculation and enhance sperm capacitation.[6]

Its constituents are proteins including many enzymes, prostaglandins, sodium (Na+), potassium (K+), magnesium (Mg2+), calcium (Ca2+), inorganic phosphorus (P), and chloride (Cl) which are macro element and microelements such as copper (Cu), iron (Fe) and zinc (Zn).[7] Some articles established that utilization of these elements in natural foods can boost germinal cell reproduction.[8]

Many randomized investigations have explored the consequence of antioxidant supplementation for the management of male infertility,[9,10] several of them establish a reasonable effect on seminal fluid quantity and quality including seminal fluid volume, sperm concentration, total sperm motility, progressive motility, and obvious reduction in the percentage of immotile sperm.[11] Among all accessible antioxidants, the most remarkably prescribed compounds include vitamins E and C, N-acetyl cysteine (NAC), carnitine, zinc (Zn), and selenium (Se).[12]

The healthy epididymis contains Carnitines in both free and acetylated forms. L-carnitine (LC) plays a main role in cellular energetic metabolism, acting as a shuttle of the activated long-chain fatty acids (acyl-CoA) into the mitochondria.[13]

Among all available antioxidants, the most frequently prescribed compounds include carnitine, vitamins C and E, N-acetyl cysteine (NAC), (Se), zinc,and selenium.[12]

FertilAid for Men is a non-prescription dietary complement that mixes multiple vitamins, amino acids, antioxidants, L-Carnitine, and a mixture of herbal constituents.[14]

FertileAid available under the brand name fertilAid manufactured in the United State. FertilAid is classified as a dietary supplement and doesn't need FDAapproval.

The ambition of the research is to appraise the effect of a mixture of vitamins and antioxidants on seminal fluid parameters in males with idiopathic infertility of unknown cause.

Study design

This study was conductedin ErbilIraq at the YadIVF Center, this center was established in 2014 and is one of the referral centers for infertility treatment. For this retrospective clinical study, data collection initiated from March 1st, 2018 to December 1st, 20.

The study involvedthirty-three subjectstheir age ranged from 21 to 44 years (33.2±5.9).A signed consent form, medical record reviewed, and patients' medical history obtained from the patient.

The baseline semen sample was taken from the patients following 3 to 7 days abstinence, it put inside an incubator at 37°C for 30 min after liquefaction, semen parameters include (volume, pH, concentration, and motility) were measured. Repeated seminal fluid analysis has been performed 3 to 7 days following the first sample.

Abnormal sperm sample subjects were given a FertilAid capsulethree times daily for 90 days then final semen analysis was taken following 3 to 7 days' abstinence.

The subjects were selected with abnormal sperm parameters, as delineated by the W.H.O. guideline is defined as one of the following: abnormal sperm count < 15000000/ml, a low percentage of motility, progressive motility < 32%, low percentage of normal morphology < 4%.[15] Composition of fertilAid formulation capsule see Table 1.

Table 1: Content and dosage of antioxidants

Tablet content (average)	Amount (dose)
Vitamin B6 (as pyridoxal 5-phosphate)	2 mg
Folate	500 mg
Vitamin B12 (methylcobalamin)	25 mcg
Vitamin A (as beta carotene)	5000 IU
Vitamin C (as ascorbic acid)	250 mg
Vitamin D (as cholecalciferol)	400 IU
Vitamin E (as d-alpha tocopheryl succinate)	150 mg
Vitamin K (as phytonadione)	80 mg
Thiamin	1.5 mg
Niacin	20 mg
Riboflavin	1.7 mg
Pantothenic Acid (d-calcium pantothenate)	10 mg
Iodin	150 mg
Magnesium (magnesium oxide)	120 mg
Manganese (manganese sulfate)	2 mg

Contd... Table 1: Content and dosage of antioxidants	
Copper (copper gluconate)	2 mg
Selenium (selenomethionine)	100 mg
Zinc (zinc gluconate)	30 mg
Chromium (chromium picolinate)	120 mcg
Proprietary mixture Asian Ginsong extract (root), Grape Seed Extract, CoQ10, L-carnitine (as L-carnitine L-tartrate).Maca (root).	890 mg

Inclusion criteria

1. Age of subjects between 21 to 40 years.
2. Unknown cause of infertility (idiopathic infertility).

Exclusion criteria:

1. Ingestion of antioxidants vitamin formulation within 30 days before enrollment.
2. Azoospermia.
3. Varicocele.
4. Urogenital infection.
5. Diabetes mellitus.

Data analysis

The following parameters were analyzed:

1. Volume of ejaculate.
2. Total ejaculate sperm count.
3. Sperm count per milliliter.
4. Percentage of progressive forward motile sperm.
5. Percentage of non-progressive motility.
6. Percentage of non-motile sperm.

Statistical analysis

Computations were performed using the statistical software package SPSS® Statistics, for Windows, Version 26. The Shapiro-Wilk test was used to determine the normal distribution of the data. A student t-test was used to compare seminal fluid `distribution, the Mann-Whitney U test was used. Changes were considered statistically significant when the p-value was 0.05 or less $p < 0.05$.

Results

The demographic findings of all patients in pretreatment and post-treatment were matched, The consequence of interference in this research showed that the three times daily administration of fertilAid for three months improved sperm count/ml from with a p-value of 0.035 while the volume of ejaculate did not show any significant change. (Table 2).

Table 2: Comparison between sperm count/ml and volume of ejaculate before and after treatment of patients with fertilAid

	Before treatment	After treatment	P value
sperm count/ml	38.44 ± 22.41	47.14 ± 29.55	0.035
volume	3.34 ± 1.09	3.6 ± 0.82	0.234

The observation of sperm parameters before and after treatment with fertilAid showed, significant enhancement in the sperm motility including progressive and non-progressive motility p-value 0.003 and 0.013 respectively see Figure 1 and Figure 2.

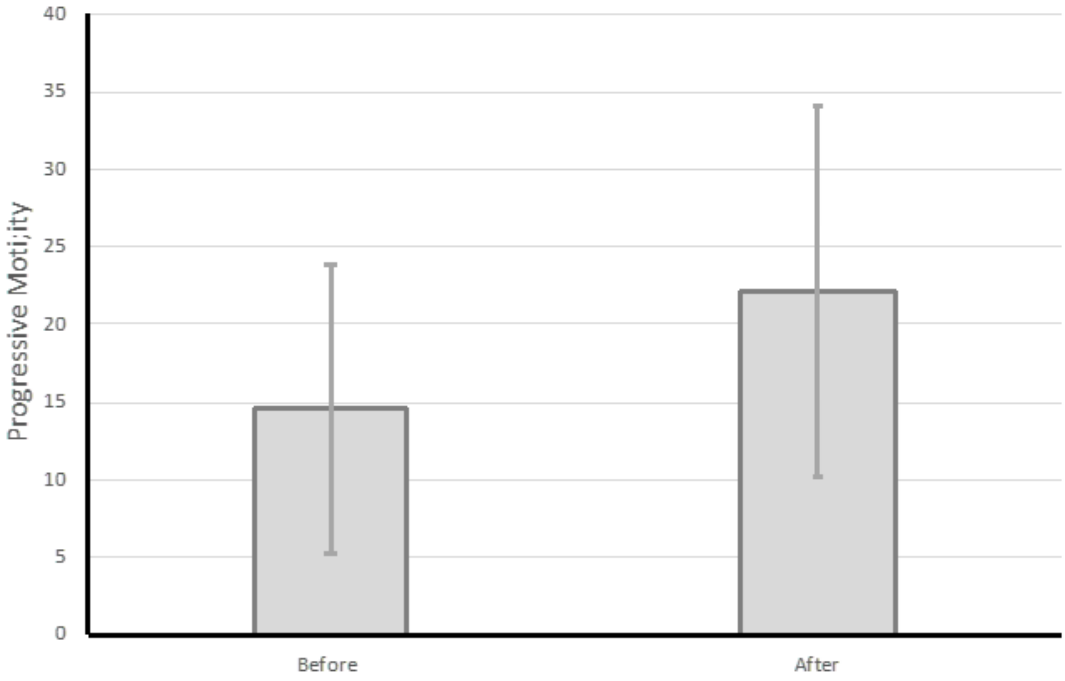

Figure 1: The percentage of progressive sperm motility before and after treatment with FertilAid.

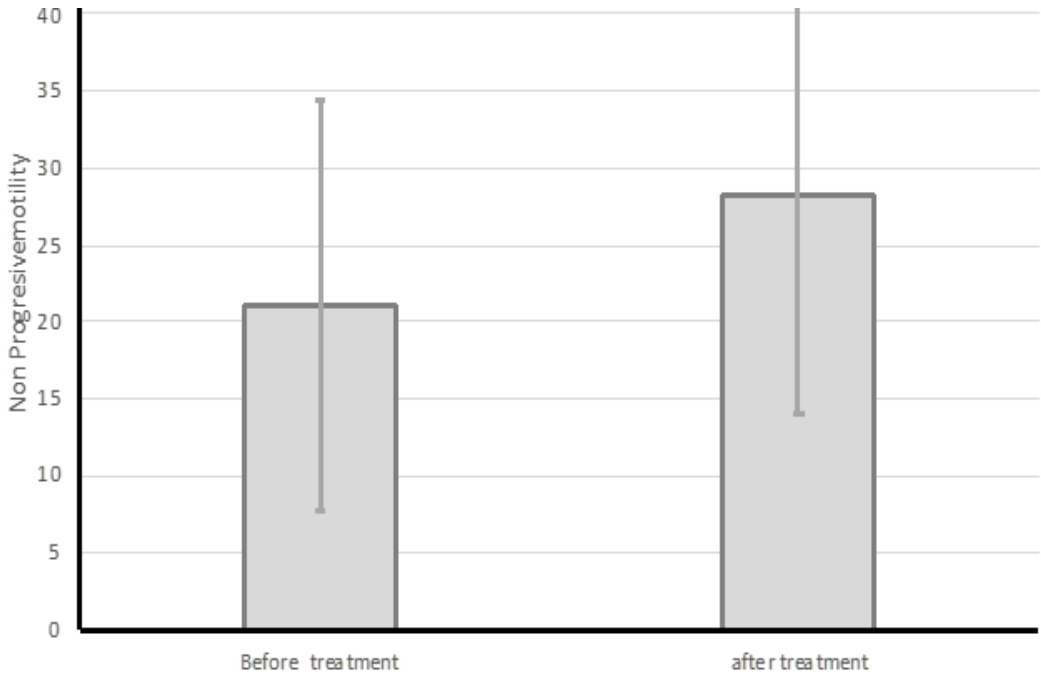

Figure 2: The percentage of non-progressive sperm motility before and after treatment with FertilAid.

The percentage of total sperm motility significantly improved with a p-value of 0.001 (Figure 3).

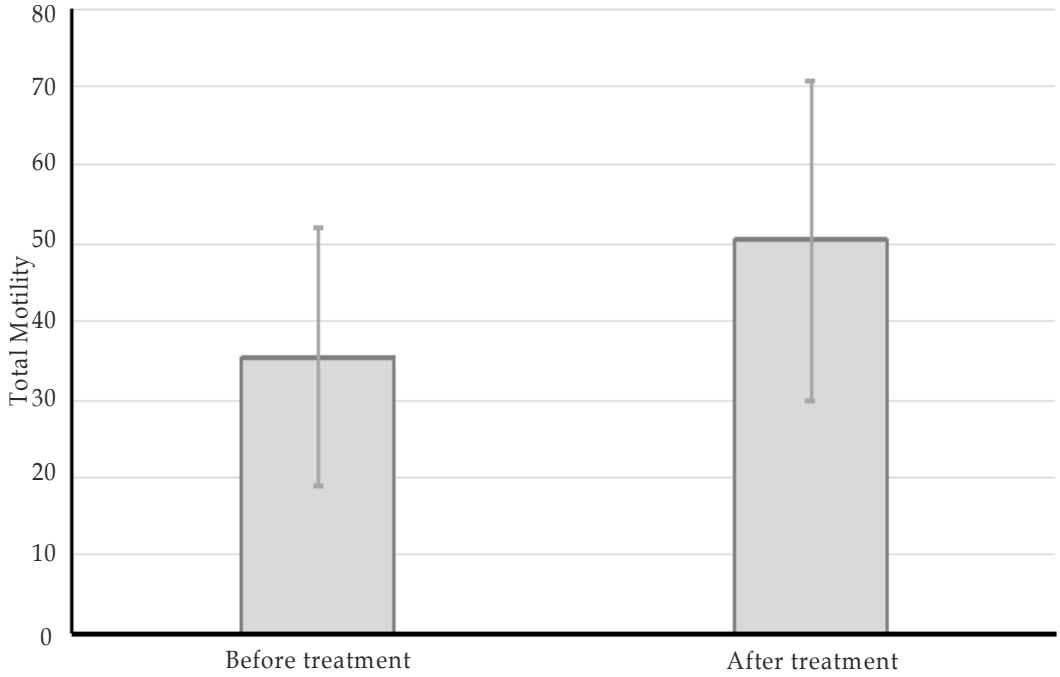

Figure 3: The percentage of total sperm motility before and after treatment with FertilAid.

On the other hand, the concentration of immotile sperm markedly reduced after three months of treatment with p-value 0.002 as shown in Figure 4.

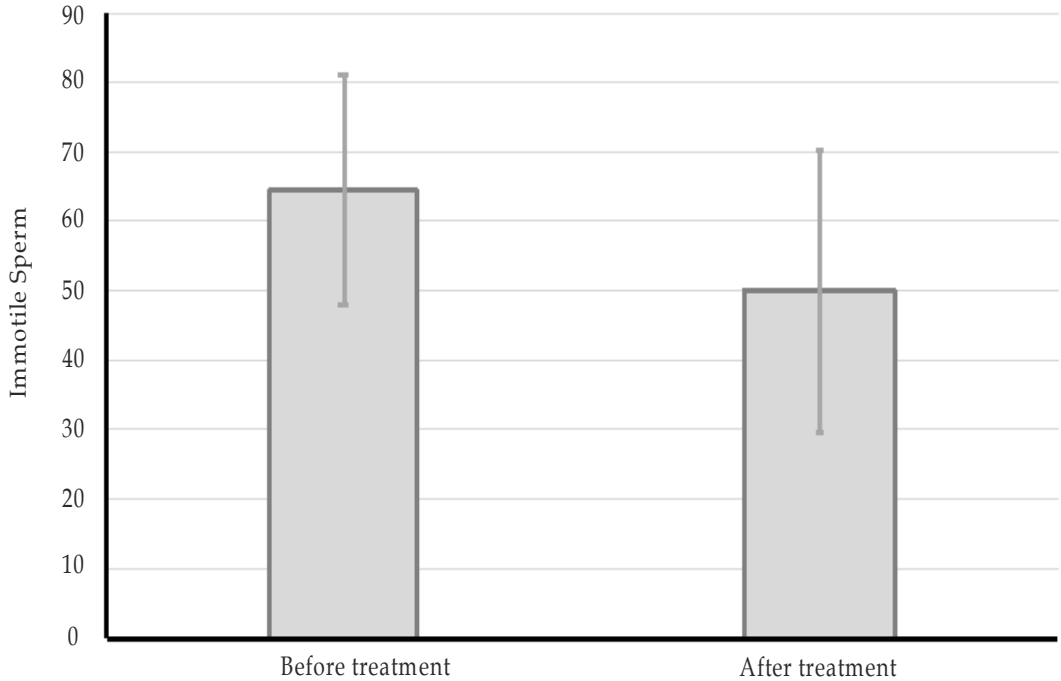

Figure 4: The percentage of immotile sperm motility before and after treatment with fertilAid.

Discussion

IOAT is described as abnormal spermatogenesis and is a status of relatively low sperm count, motility, and a high count dysmorphism of spermatozoa in the ejaculate. Almost 30% of Oligoasthenoteratozoospermic (OAT) patients are diagnosed as idiopathic.[5,16]

Commonly, there are two different approaches to

the management of IOAT: pharmacological treatment and/or assisted reproductive technology (ART). The purpose of pharmacological treatment is to stimulate spermatogenesis and to boostsperm maturity, mobility, and diminish sperm dysmorphism.

Harmless consequences of oral antioxidant at or below the recommended daily doses makes antioxidant supplementation a reasonable treatment regimen before continuing with more invasive and expensive managements such as in vitro fertilization or Intracytoplasmic sperm injection.[17]

In this research, we have inspected the effectof a combination of L-Carnitine tartrate, Zinc, Maca Root, Asian Ginseng Lots of Antioxidants Vitamin C, E, Beta Carotene, and Selenium plus CoQ10, B12 as pharmacological treatment boosting semen parameters of cases with IOAT.

They were used in various clinical trials, either singly or in combination with the agents, to correct sperm parameters especially sperm motility and concentration.[7,8,18,19, 20]

Considering sperm concentration, there was a considerable increase in sperm concentration in treated patients. This is in accord with other studies that declared a significant increase in concentration, due to vitamin E content and Beta carotene which Neutralizes free radicals and cushions the cellular membrane against oxygen free radicals, and increase in sperm concentration and motility reduction in oxidative stress measures and SDF (sperm DNA fragmentation).[9,21,22,23,24]

Maca (Lepidium meyenii) improves sperm formation increased stages of mitosis of germ cells Neurobiological activity of antioxidant protection increase sperm concentration, total sperm count, and sperm motility.[25,26,27,28,29]

Also, the Korean ginseng extract content of the product Induces spermatogenesis via CREM (cAMP-responsive element modulator) activation, increase LH, and FSH, total and free testosterone levels, decrease in PRL(prolactin) in turn increase motility and a total number of sperm.[30,31,32]

The target of the research was the enhancement of sperm motility, considering overall motility (progressive and non-progressive motility). Statistically considerable enhancement in the sperm motility including the percent of overall sperm motility and a significant decrease in the percent of immotile sperm. According to the results of previous studies on the amino acid, L-Carnitine shows to boost sperm metabolism and increase the capability of sperm to convert complex molecules into energy, significant effect on sperm motility of men with IOAT.[12,33,34] In some studies, a dose of 3 gr carnitine administer daily for four months' duration has a considerable improvement of sperm motility in comparison to pretreatment levels. However other studies concluded that a higher dose of LC around 4 grams administer daily over a more shortened period of treatment (two months) could considerably improve the progressive sperm motility.[16,35]

Invitro semen activation by fertilAid exhibited a considerable increase in the total semen parameters as compared to the activation by L. Carnitine.[36] Vitamin B12 at 2.50 mg/mL addition to bovine seminal fluid in vitro enhanced sperm motility [37]. An oral antioxidant medication containing vitamin B12 found to enhance sperm motility, vitality, and DNA integrity.[38]

Conclusion

The administration of a combination of L-Carnitine tartrate, Zinc, Maca Root, Asian Ginseng Lots of Antioxidants Beta Carotene, Seleniumand vitamin C, E, plus CoQ10 in IOATpatientnotably increase the sperm count per milliliter.It also significantly improves overall sperm motility including progressive motility and non-progressive motility and a decrease in the concentration of immotile sperm.

Abbreiations

OAT: oligoasthenoteratozoospermia. IOAT: Idiopathic Oligoasthenoteratozoospermia. ART: assisted reproductive technology.LC: L-carnitine. NAC: N-acetyl cysteine. FDA: food and drug administration.IVF: in vitrofertilization. ART: assisted reproductive technology.SDF: sperm DNA fragmentation. CREM: cAMP-responsive element modulator. PRL: prolactin.

Declarations

Ethics approval:

This work has been approved by the ethics committee in the College of Medicine/Hawler Medical University with approval number meeting code: 3 paper code: 3.

Availability of data and material

The material and data used and analyzed for the study are available from corresponding authors on sensiblerequest.

Conflict of interest: none

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