Original Article

Effectiveness of zinc administration in asthenospermia in infertile patients

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Objective: To determine the efficacy of zinc therapy in male asthenospermia patients presented with infertility at PAEC hospital, Islamabad

Methodology: This descriptive study was conducted at Department of Urology, PAEC hospital, Islamabad from May 2015 to November 2015. WHO calculator was utilized for sample size calculation and Non probability sampling was used. Married males, age-18-50 years and lab findings showing asthenospermia were included in the study. Patients were provided with 20 mg zinc sulphate (per day) for time period of 3 months. Semen analysis was done for pre and post treatment sperm motility. Data were analyzed in SPSS. Comparison was done with independent t test and association was measured with Chi-square test. P≤ 0.05 was considered significant.

Results: Total 90 infertile males were included in study. Mean age of patients was 33.09±4.93 years. Baseline percent sperm motility was 2.05±3.33 and after 3 months percent sperm motility was 26.76±12.9SD (t=8.827, df=88, p=0.0000). Efficacy of zinc therapy is significantly associated with marriage duration (p<0.05) and insignificantly associated with age (p>0.05)

Conclusion: Zinc supplementation is an effective, safe and feasible therapy for asthenospermic infertile males. It was associated with significant increase in sperm motility. (Rawal Med J 202;45:99-102).

Keywords: Asthenospermia, zinc supplementation, sperm motility.

INTRODUCTION

Infertility is a major reproductive concern through ages, affecting 8-12% of families worldwide.[1] World Health Organization (WHO) defined infertility as inability to have clinical pregnancy after regular (unprotected) sexual intercourse for consecutive 12 months.[2] Globally, an estimated 70-80 million couples are affected with fertility issue.[3,4] Male infertility is defined as male's inability in conduction of fertile female pregnancy. It may be due to defect in sperm concentration, sperm motility or sperm morphology. It contributes to infertility in 40% to 50% in males.[5] Semen analysis is cornerstone for male infertility investigation.[6] According to WHO guidelines, following parameters are necessary to be present for fertility i) volume 1.5mL, ii) sperm concentration 15 million spermatozoa/mL, iii) total sperm number 39 million, iv) Morphology 4% normal v) Vitality 58% live, vi) Progressive motility 32% and vii) Total (progressive plus non-progressive motility) 40%.[7]

Male infertility is classified as oligospermia (low sperm concentration), teratospermia (abnormal sperm morphology) and asthenospermia (poor sperm motility). Asthenospermia is defined as sperm motility reduction, however, 100% immotile spermatozoa is found in 1/5000 men.[8] Asthenospermia is caused by ultra-structural abnormalities of sperm flagellum, metabolic deficiencies and necrozoospermia. It is associated with sperm quality decrease and leads to major infertility/reduced fertility among men.[9]

WHO reported that 1/3 population is suffering with zinc shortage in diet. Zinc deficiency is associated with reproduction impairment among male and female (if <5ppm). Seminal fluid contains a high concentration of zinc while it has significant impact on sperm functional properties. Zinc is thought to be involved in oxidative metabolism of sperms and act as an anti inflammatory agent. It contributes to lipid flexibility, spermatozoa physiology and sperm membrane stability process.[10] Zinc therapy had

significant improvement in progressive motility of sperm and sperm count.[11] Sperm membrane stability increases with zinc supplementation.[12] Limited data are available on efficacy of zinc in asthenospermian in Pakistan. So, present study aimed to determine the efficacy of zinc therapy in male asthenospermia patients.

METHODOLOGY

This descriptive case series was conducted at Department of Urology, PAEC Hospital, Islamabad from May 2015 to November 2015. WHO calculator was used for sample size calculation with 25% anticipated population proportion, 9% absolute precision, 95% confidence interval and final sample size reached 89~ 90 Infertile male patients.[13] Patients were selected with non probability consecutive sampling. Inclusion criterion was based upon married male, age-18-50 years and lab findings showing asthenospermia. Exclusion criterion was based upon urinary tract infection, smoker, patients on antioxidant supplementation, patients with endocrinopathy, undescended testis and varicocele, on medicines that affect sperm count (Alpha blockers, ketoconazole, opiates, selective serotonin reuptake inhibitors and nifedipine) and had a child birth in last year. Ethical permission was taken from PAEC Hospital and all patients gave written consent.

Patients received 20 mg zinc sulfate per day for period of 3 months. Semen analysis was done and sperm motility was determined before and after zinc therapy. Zinc therapy was considered effective if sperm motility improved >50% in semen analysis from baseline after 3 months.

Statistical analysis: Data were analyzed in SPSS version 23. Independent T test and chi-square test was applied. P value ≤0.05 was considered significant.

RESULTS

In present study, total 90 infertile males were included in study. Mean age of patients was 33.09±4.93 years. Mean duration of marriage was 4.10±2.6 years. Baseline percent sperm motility was 5-25 in 30(33.4%) patients and 26-45 in 60(66.6%) patients. After 3 month treatment, percent sperm motility was 10-40 in 37(41.2%) patients and 41-80 in 53(58.8%) patients. Baseline percent sperm motility was 2.05±3.33SD and after 3 months percent sperm motility was 26.76±12.9SD (t=8.827, df=88, p=0.0000) as shown in Table 1.

Table 1. Comparison of change in sperm motility before and after treatment (n=90).

Change in sperm motility	Mean	Standard Deviation	T value	Degree of freedom	P value
Baseline	2.05	3.33	8.827	88	<0.001
After 3 months	26.76	12.9			

Table 2. Association between zinc therapy, duration of marriage and age.

Duration of marriage	Zinc therapy effective		Total	P value
	Yes	No		
2-6 years	48(53.4%)	27(30%)	75(83.3%)	0.02
7-12 years	5(5.6%)	10(11.2%)	15(16.7%)	
Age				
26-35 years	36(40%)	22(24.4%)	30(33.4%)	0.409
36-45 years	17(18.9%)	15(16.7%)	60(66.6%)	
Total	58(64.5%)	32(35.6%)	90(100%)	

Among all the patients with marriage duration 2-6 years, 75(83.3%) and 48(53.4%) had shown effective zinc therapy, while it was not effective in 27(30%). Among all the patients with marriage duration 7-12 years, 15(16.7%) and 5(5.6%) showed zinc therapy effective and 10(11.2%) did not show any improvement with zinc therapy (p=0.02). Among all the patients with age group 26-35 years, 30(33.4%) and 36(40%) showed improvement with zinc therapy and 22(24.4%) did not show improvement with zinc therapy. Among all the patients in age group 36-45 years age group, 60(66.6%) and 17(18.9%) showed effective sperm motility after zinc therapy while 15(16.7%) did not show any improvement with zinc therapy (p=0.409), as shown in Table 2.

DISCUSSION

Zinc deficiency affects wide range of enzymes and hormones in male reproductive system leading towards adverse affects on reproduction. Zinc is essential in luteinizing hormone secretion and

synthesis. Moreover, zinc therapy alone or in combination with Vitamin E is very effective for male reproductive system.[14]

In present study, 90 infertile males were included in study. Sperm motility was significantly higher after 3 months of zinc therapy as compared to base line sperm motility (26.76±12.9SD vs 2.05±3.33SD, p=0.000). Dissanayak et al reported that only those patients impregnated their partner who had shown a significant increase in sperm motility after zinc sulfate therapy (p=0.05). Moreover, zinc sulfate is an effective treatment with pregnancy rate more than 50% (p=0.05).[15] Lewis-jones et al reported that zinc therapy is associated with significant sperm motility increase after 4 months (p=0.03) and greater chance for pregnancy (p=0.00).[16]

In our findings, patients with marriage duration 2-6 years were more prone to get effective increase in sperm motility after zinc therapy as compared to patients with marriage duration 7-12 years (p=0.02). Saeed et al reported that time period of marriage had no significant impact on sperm motility (p=0.34).[17] However, Zegers et al reported that patients with marital duration >10 years did not show significant improvement in sperm motility after zinc therapy (p=0.01).[18] Jalali et al reported findings similar to our study with an inverse correlation between marriage duration and sperm motility increase (p=0.00).[19] Another similar study showed direct relation between active motility and zinc therapy while an inverse relationship was found between zinc therapy and immotile fraction (p=0.01).[20]

In our study, percent sperm motility was higher in 58.8% male patients after 3 months of zinc therapy (percent sperm motility ranges 41-80). Menella et al reported that percent sperm motility significantly improved in patients treated with zinc supplementation for at least one month (p=0.05).[21] Zinc supplementation is associated with arginase activity in asthenospermia patients leading towards seminal plasma normal values and increase sperm motility.[22] A systematic analysis reported that zinc supplementation increased metallothioneins in seminal fluid b increasing zinc binding proteins in asthenospermic patients alternatively leading towards high sperm count and enhance sperm motility.[23]

Asthenospermia as social stigma in Pakistani males limits their participation in study led us towards small sample and limits generalizability of study.

CONCLUSION

Zinc supplementation is an effective, safe and feasible therapy for asthenospermic infertile males. It is associated with significant increase in sperm motility. Antiperoxidant activity of zinc leads seminal plasma level to normal ranges. However, further research is required in understanding pregnancy rate with zinc therapy in wives of asthenospermic patients.

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