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Original Research Article

Improvement of semen quality after treatment with folic acid and zinc in subfertile men in a tertiary hospital

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ABSTRACT

Background: The 50% of all male infertility is idiopathic, and there is currently no recognized treatment. The effectiveness of a nonprescription nutraceutical comprising eight nutrients on sperm quality in males with idiopathic infertility was studied. The aim of the study was to evaluate improvement of semen quality after treatment with folic acid and zinc in subfertile men.
Methods: This prospective observational study was carried out in the infertility unit, department of obstetrics and gynaecology, Bangabandhu Sheikh Mujib medical university (BSMMU), Dhaka, Bangladesh from January 2018 to June 2020. Approval from local ethics committee was obtained for this study.
Results: One hundred and twenty-five male subfertile patients were included in this study. Most men, 99 (79.2%) belong to more than 30 years, followed by 26 (20.8%) less than 30 years, range was 25 to 50 years. Mean ± SD age was 35.3±5.1 years. Rapid linear (RL) before treatment were 16.06±14.46 (mean ± SD) and after treatment were 22.82±13.40 (mean ± SD). Slow linear (SL) before treatment were 17.56±12.06 (mean ± SD) and after treatment were 19.75±9.25 (mean ± SD). Non progressive (NP) before treatment were 10.82±8.95 (mean ± SD) and after treatment were 10.12±7.34 (mean ± SD). Morphology of the sperm before treatment were 19.43±15.48 (mean ± SD) and after treatment were 30.18±19.12 (mean ± SD).
Conclusions: Our research findings fully correspond to the above research results, so it can be said that treatment of subfertile men with micronutrients like folic acid and zinc sulfate causes increase of semen quality and thus plays a key role in treatment of male subfertility.

Keywords: Male subfertility, Semen analysis, Sperm quality

INTRODUCTION

Infertility may be defined as a lack of conception after 1-2 years of unprotected coitus.[1] In a normal population approximately 60% of couples will achieve pregnancy within 6 months, 80% by 12 months, and 90% by 18 months leaving approximately 10 % of couples arbitrarily classified as infertile. A general classification of causes of infertility are male 35-40%, female 40-50% (tubal 25%, ovulatory 20% and cervical 1-2%), sexual 10% and unknown 10%.[2] Infertility affects approximately 15 % of couples. Roughly 40 % of cases involve a male contribution or factor, 40 % involve a female factor, and the remainder involves both sexes.[3] According to the American Society for Reproductive medicine, infertility affects about 6.1 million people in the United States, equivalent to 10% of reproductive age population. Female infertility accounts for 1/3rd of infertility cases, male infertility another 3rd combined male and female infertility for another 15% and remainder of cases is 'unexplained.[4]

Factors relating to male infertility are: Pretesticular causes-i) Endocrine problems, i.e., diabetes mellitus, thyroid disorders; ii) hypothalamic disorders, i.e., Kallmann syndrome, hyperprolactinaemia; iii) hypopituitarism; iv) hypogonadism due to various causes; v) psychological factors; vi) drugs, alcohol. Testicular factors-i) genetic defects on the chromosome Y and chromosome microdeletions; i) abnormal set of chromosomes i.e., Klinefelter syndrome; iii) neoplasm, i.e., semiformal; iv) idiopathic failure; v) Cryptorchitsm; vi) varicocele; vii) trauma; viii) hydrocele; ix) mumps; x) testicular dysgenesis syndrome. Post testicular causes-i) vas deferens obstruction; ii) infection, e. g. prostatitis; iii) retrograde ejaculation; iv) hypospadias; v) impotence.[5-8] Some causes of male infertility can be determined by analysis of the ejaculate, which contains the sperm. The analysis includes counting the number of sperms and measuring their motility under a microscope: a) producing few sperm, oligospermia, or no sperm, azoospermia, and b) a sample of sperm that is normal in number but shows poor motility, or asthenozoospermia.[9,10]

As the quality of semen is vital in case of male fertility, the aim of the present study was to compare the quality of semen of the subfertile men after treatment with the drugs like folic acid and zinc in combination. After treatment of the subfertile men with the above drugs, the authors compared the quality of the semen to the previous sample.

METHODS

This prospective observational study was carried out in the infertility unit, department of obstetrics and gynaecology, Bangabandhu Sheikh Mujib medical university (BSMMU), Shahbag, Dhaka, Bangladesh, from January 2018 to June 2020. Approval from local ethics committee was obtained for this study. One hundred and twenty-five male subfertile patients were included in this study. Consent of the study men was taken. Their semen was analyzed first before treatment with folic acid and zinc. Then the drugs folic acid 5mg and zinc sulfate 66mg were given daily orally for 2 to 4 months. After treatment with the above drugs, their semen was analyzed and compared with the previous results. Data will be processed and analyzed using computer software SPSS (Statistical package for social sciences) for windows version 24.

RESULTS

Table 1 shows the general characteristics of the study patients (n=125). Most men, 99 (79.2%) belong to more than 30 years, followed by 26 (20.8%) less than 30 years, range was 25 to 50 years. Mean ± SD age 35.3±5.1 years.

Table 1: General characteristics of the study patients.

Characteristics	N	Percent (%)
Age group (years)		
<30	26	20.8
>30	99	79.2
Total	125	100.0
Mean ± SD	35.3±5.1	
Range	25-50	
Residence		
Rural	74	59.2
Urban	51	40.8
Socioeconomic status		
<20000	7	5.6
20000-40000	101	80.8
>40000	17	13.6
Occupational status		
Business	64	51.2
Service	61	48.8

Table 2: Comparison of semen analysis before and after treatment with tab. folic acid and zinc, (n=125).

Parameters	Semen analysis		P value
	Before treatment, mean ± SD	After treatment, mean ± SD	
Total sperm concentration (million)	39.70± 52.96	59.66± 60.82	<0.001*
Total motility	42.75± 17.73	52.53± 18.72	<0.001*
Rapid leaner (RL)	16.06± 14.46	22.82± 13.40	<0.001*
Slow linear (SL)	17.56± 12.06	19.75± 9.25	0.038*
Non progressive (NP)	10.82± 8.95	10.12± 7.34	0.537
Morphology	19.43± 15.48	30.18± 19.12	<0.001*

Data were expressed as mean ± SD, *significant, p value reached from paired t-t est.

Regarding socioeconomic status (monthly income), mostly 101 (80.8%) were between 20000-40000 Tk. Per month, then 17 (13.6%) were more than 40000Tk, and 7 (5.6%) were below 20000Tk. Occupation of the study patients in order of descending frequency were business 64 (51.2%), then, service 61 (48.8%). Residence of the study men were more from rural 74 (59.2%), than urban 51 (40.8%). Table 2 shows the comparison of semen analysis before and after treatment with tab. Folc acid and Zinc (n=125). Total sperm concentration (million/ml) before treatment were 39.70±52.96 (mean ± SD), and after treatment were 59.66 ± 60.82 (mean ± SD). Total motility of sperm before treatment were 42.75±17.73 (mean ± SD), and after treatment were 52.53±18.72 (mean ± SD). Rapid linear (RL) before treatment were 16.06±14.46 (mean ± SD) and after treatment were 22.82±13.40 (mean ± SD). Slow linear (SL) before treatment were 17.56±12.06 (mean ± SD) and after treatment were 19.75±9.25 (mean ± SD). Non progressive (NP) before treatment were 10.82±8.95 (mean ± SD) and after treatment were 10.12±7.34 (mean ± SD). Morphology of the sperm before treatment were 19.43±15.48 (mean ± SD) and after treatment were 30.18±19.12 (mean ± SD).

DISCUSSION

The nutritional combination studied was intended to treat idiopathic male infertility by providing various vitamins, enzymes, and trace elements necessary for normal sperm cell metabolism, DNA synthesis during spermatogenesis, proliferation, and anti-oxidative protection. These components are extremely important for male reproduction due to their metabolic action. Male fertility may be disrupted if these nutrients are deficient. The content of the study was chosen with the reasoning that each element has been found to boost sperm parameters that may lead to conception. Spermatozoa use L-carnitine as an energy source. Sperm count, motility, and motile sperm density are all favorably linked with free L-carnitine.[11] Although multiple controlled studies have demonstrated that each of these characteristics has a favorable impact, a recent investigation on men with idiopathic asthenospermia revealed no significant effect on sperm motility or total motile sperm counts. According to 21 studies, nitric oxide (NO) improves sperm viability and motility in both fertile and infertile people.[12] The direct precursor of NO is arginine. L-arginine enhanced sperm motility in infertile men with normal cell counts 23 and improved sperm motility in asthenozoospermic men in vitro. 24 In asthenospermic males, vitamin E enhanced sperm motility and allowed for fertility.[13] And greatly increased human spermatozoa in vitro function in separate tests.[14] Vitamin E, when combined with selenium, enhanced sperm motility and normal morphology rates.[15]

The present study was designed to see the improvement of semen quality with the treatment by tab. folic acid and zinc which affects the better outcome of fertility in the subfertile men. From literature we found that treatment with folic acid and zinc improves the quality of sperm of subfertile men which helps to improve the fertility of the subfertile patients. March 20, 2002-men who have trouble conceiving may get a boost from nutritional supplements that increase sperm count. A new study found a combination of folic acid and zinc supplements increased sperm count by 74% in men with fertility problems. The Dutch study, published in the March issue of Fertility and Sterility, looked at the effects of the supplements in men with low sperm counts whose female partner had not conceived after one year of regular, unprotected intercourse. Researchers found that the men with fertility problems who took 5mg of folic acid a day and 66 mg of zinc sulfate a day for 26 weeks had a 74% increase in total normal sperm count and a minor (4%) increase in abnormal sperm count.[16] Our research findings fully corresponds to the above research results, so it can be said that treatment of subfertile men with micronutrients like folic acid and zinc sulfate causes increase of semen quality and thus plays a key role in treatment of male subfertility.

Limitations

The present study was conducted in a very short period due to time constraints and funding limitations. The small sample size was also a limitation of the present study.

CONCLUSION

Male factor subfertility is a multifactorial disorder. Our findings emphasize the importance of the two micronutrients on spermatogenesis. Unlike genetic factors, nutritional factors can be changed by increasing intake. However, whether the improvement in sperm concentration observed after administration of folic acid and zinc will lead to an increase in pregnancy rates remains to be established.

Recommendations

Before wide-scale implementation of combined zinc and folic acid administration, we recommend that a larger, randomized placebo-controlled study on the efficacy and safety of these nutraceuticals be done. Nevertheless, our findings suggest new avenues of future fertility research and treatment.

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