Original Article

Study of Serum Selenium Level And Its Effect on Male Infertility

Khodiar P K, Verma A R[1], Tikariha B P[1], Patra P K

Department of Physiology[1], Biochemistry,

Pt.J.N.M.Medical College, Raipur (C.G.) India.

ABSTRACT

Some of the biomedical research has shown interest in the anti-oxidant activity of selenium which could be due to evidences reported that oxidative damage to cells and cell membranes is one of the causative agents in the pathogenesis of many disease states including male infertility.

The present study was undertaken with the objective to measure role of Selenium levels in male infertility and assess the effect on different parameters like sperm count, sperm morphology & sperm motility. Our study included 58 infertile and 52 normal fertile males in age group of 22-50 years. The apparent difference in serum Selenium between the normal fertile controls and infertile cases turned out to be statistically significant (p <0.01) and there seems to be a positive correlation between low serum Selenium levels and semen quality parameters like count, motility and morphology. It is proposed that Selenium acts as free radical scavenger and improves semen quality by virtue of antioxidant component of selenoprotein and classical glutathione peroxidase (GPx)

Key words : *Infertility Selenium Glutathione peroxidase*

INTRODUCTION

Infertility can be defined as " The inability of a couple to conceive after one year of sexual intercourse without using any contraception." Infertility is said to be primary if the couple have had no previous pregnancy and secondary if there has been at least one pregnancy irrespective of its outcome. About 25 % of couple experience infertility at some point in their reproductive lives. The male partner contributes about 40 % of cases of infertility and a combination of factors is common . Primary Infertility affects 15 -20 % of married couples . Approximately one third of cases result from male factor ,one third from female factors ,and one third from combined factors. Infertility remains unexplained in up to 20 % of cases.

The introduction of micronutrients has revolutionized the treatment of many diseases in general. Selenium is an essential element required for normal human growth and reproduction and has been demonstrated to be a constituent of spermatozoa and essential micronutrient for spermatogenesis. Incorporation of this element occurs into the mid piece of spermatozoa and almost all the selenium in spermatozoa is contained in the mitochondrial

Corresponding Author:

Dr A. R. Verma,

Assistant Professor , Dept. of Physiology

Pt. JNM Medical College , Raipur,(CG)

India.-492001

E-mail: dr_arv2009@rediffmail.com

Mob: 09926177893

capsule.[1]

Selenium is considered to exert its biological activity mainly via selenoproteins, which contain selenium in their active centers as a part of the 21st proteinogenic amino acid selenocysteine. Selenocysteine is incorporated co-translationally in to at least 25 or 24 different gene products in humans and rodents, respectively.[2] Most of selenocysteine containing proteins have been functionally characterized as enzymes catalyze redox-reactions including members of the family of glutathione peroxidases (GPx) thioredoxin reductases or iodothyronine deiodinases.[3] Thus selenium is essential for normal spermatogenesis.

AIM OF THIS STUDY

To see if there is any relationship between the serum selenium level and its effect on semen quality parameters like sperm count, motility and morphology.

MATERIALS AND METHODS

The subjects included were infertile patients attending the infertility clinic and were divided into 2 groups viz. infertile male patients and healthy voluntary male controls. Semen Analysis (sperm count, morphology, motility) was done by experienced pathologist and serum selenium level was estimated by Atomic Absorption Spectrophotomer in all the 110 subjects. The Selenium concentration in all studied material were expressed as µg /L and the normal reference range being 63 to 160 µg /L.[4] All the data were analyzed by simple prospective study and chi-square test using SPSS-13 software.

RESULT AND DISCUSSION

In our study out of 110 subjects 58 (57.73%) were cases of male infertility and 52 (47.27%) were healthy male fertile control groups. Maximum number of patients belongs to age group 31-35 years, youngest patient was aged 22 years and oldest was aged 50 years.

It is seen that 42 (72.41%) cases were oligospermic where as 8 (15.38%) controls were oligospermic although they were fertile but 16 (27.58%) cases having normal sperm count were infertile and in control group 44 (84.62%) subjects had normal sperm count and were fertile .It seems that not only selenium but some other factors also contribute to decrease sperm count.
In present study it is seen that 46 cases and 11 control had abnormal morphology of sperm. 12

Table - 1 - **Comparison of different indices in cases and controls.**

	Normal sperm count	Normal sperm motility	Normal sperm morphology	Mean serum selenium level
Cases (n=58)	38.032 %	34.73 %	37.28 %	66.0±16 µg /L.
Controls (n=52)	82.79 %	62.26 %	57.64 %	92.6±26 µg /L.

cases with normal sperm morphology had infertility and 41 controls had normal morphology and fertility.

Sperm motility was less than 50% in 46 cases and 12 controls and it was more than 50% in 12 cases with infertility and 41 controls. Kiran P et al, compared sperm characteristics among patients undergoing infertility evaluation and concluded that sperm motility and count provide more accurate information than morphology.[5]

Serum selenium level was less than normal in 42(72.4%) cases and normal in 10 (17.24 %) cases and above the normal in 6 (10.34 %)cases. In control group 38 (73.08 %) cases had normal serum selenium, 8 (15.38 %) cases had more than normal and 6 (11.54 %) had less than normal serum selenium levels . The apparent difference in serum Selenium between the normal fertile controls and infertile cases turned out to be statistically significant ($p<0.01$).

Saaranen et al, have shown that sperm selenium level of infertile men is lower than that of men with normal reproductive function and that low sperm motility is associated with decreased sperm selenium concentration.[6]

Scott R et al, have shown selenium supplementation to subfertile men to effect a significant increase in sperm motility that was not achieved by any of the other antioxidants micronutrient supplied.[7]

Our study is in accordance with the study of Bleau G et al, and Krzysztof et al, which state that optimal levels (98.2±32 µg/L) of serum selenium is required for normal spermatozoa development (count, motility, and morphology). In present study we found that optimal range of serum selenium spanned from 57.0 to 118.0 µg/L in the normal healthy controls. Below this range it may cause decrease sperm count , abnormal morphology of sperm and decreased motility of sperm.[8]

Selenium acts as free radical scavenger and improves the semen quality by virtue of as a component of selenoprotein, classical glutathione peroxidase (GPx-1)etc.

Spermatozoa contain the highest concentration of selenium of any mammalian tissue, with requirement increasing at the onset of spermatogenesis. At least 50% of capsule material which supports the helix of mitochondria is (GPx-4). Deficiency of selenium impairs sperm mitochondria capsule synthesis, which affects sperm motility and may induce infertility. Selenium supplementation studies in infertile men increases fluid selenium concentration and improve sperm motility.

Hansen JC et al, found that selenium to be essential for normal spermatozoa development in both experimental animals and livestock and probably also in humans.[9] In humans contradictive informations are also found. Some studies have found inverse correlation between serum selenium and number of spermatozoa and motility.[10]

Based on the important biological function of selenium in male reproduction in particular and health in general, it is suggested that there should be daily increased consumption of a selenium-rich diet with increasing age and also by those individuals with high oxidative stress conditions such as chronic diseases (diabetes, cardiovascular disease, HIV) and

alcoholics and smokers. We had 11 numbers of controls who showed abnormal sperm quality despite having normal selenium. This may suggest that serum selenium may be one of the important factors for male infertility and other factors need to be studied.

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