**Scholars Journal of Applied Medical Sciences (SJAMS)** **ISSN 2320-6691 (Online)**
**Sch. J. App. Med. Sci., 2015; 3(2F):966-968** **ISSN 2347-954X (Print)**

(An International Publisher for Academic and Scientific Resources)
www.saspublishers.com DOI: 10.36347/sjams.2015.v03i02.086

**Research Article**

# Maternal Zinc Status during Pregnancy

**Tadas Swati A.[1*], Ghule Sucheta V.[2], Tadas Arun K.[3]**
[1]Assistant professor, Department of Physiology, Government Medical College & Hospital, Nagpur, Maharashtra, India
[2]Associate professor, Department of Biochemistry, Indira Gandhi Govt. Medical College, Nagpur, Maharashtra, India
[3]Professor & Head, Dept of Biochemisry, Shri Vasantrao Naik Government Medical College, Yavatmal, Maharashtra, India

***Corresponding author**
Dr. Tadas Swati A
Email: swatitadas@rediffmail.com

**Abstract:** Zinc is an important trace element that plays an important role in metabolism, growth, development and reproduction. Its requirement increases in pregnancy. The study was designated to evaluate zinc status of normal pregnant women compared with that of non-pregnant controls. Present study included 50 healthy non-pregnant controls and 50 normal pregnant women attending Govt. Medical College and Hospital Nagpur. The fasting blood sample were collected and analyzed by standard method on semi-auto-analyzer. The mean levels of zinc were calculated in both cases and controls. The statistical analysis was done which revealed significantly ($p < 0.01$) low serum levels ($3.05 \pm 1.44$ micro moles/L) of zinc in normal pregnant women as compared to controls ($6.01 \pm 1.15$ micro moles/L). During pregnancy the demand of zinc is increased which if not met leads to congenital malformations. Considering the severe impact of zinc deficiency our study reinforce the consumption of zinc rich diet or zinc supplementation during second and third trimester of pregnancy.
**Keywords:** Zinc, Pregnancy.

## INTRODUCTION

Zinc is the second most abundant trace element in the body [1]. The variety of zinc deficiency related clinical disorders has implicated the importance of zinc in human nutrition. Important zinc containing metalloenzymes include carbonic anhydrase, alkaline phosphatase, DNA polymerase, RNA polymerase, thymidine kinase, carboxypeptidase, alcohol dehydrogenase, glutamate dehydrogenase and superoxide dismutase [2]. In addition to its role in catalysis as a coenzyme, role in growth and reproduction and gene expression, zinc also stabilizes the structure of proteins and nucleic acids preserving the integrity of sub-cellular organelles by acting as a cofactor for important antioxidant enzymes [3].

Various studies have indicated decreased levels of zinc in normal pregnant women which leads to zinc deficiency related disorders like intrauterine growth disorders and congenital malformations. Impairment in zinc levels affect the vital functions related with fetal development [4]. Even in animal studies zinc levels has been related with congenital malformations in indicating zinc as one of the important nutritional factors [5]. Also zinc being a part of Superoxide dismutase which is a antioxidant enzyme, concentrations of zinc is also the determinant of the oxidative stress in pregnant women [6]. Considering the severe disorder associated with zinc deficiency in pregnant women, the study was carried out to find out the serum zinc status in normal pregnant women attending the ANC clinic in GMC and Hospital Nagpur.

## MATERIAL AND METHODS

The study was carried out in the Department of Physiology Government Medical College and Hospital, Nagpur after obtaining permission from ethical committee. In this case control study, Group A consisted of 50 normal pregnant women i.e. cases in the age group of 25-35 yrs ($2^{nd}$ and $3^{rd}$ trimester) attending ANC clinic. Cases with history of liver disease, gastrointestinal disorders, any inflammatory disorder, therapeutic causes of zinc deficiency like steroid medication and prolonged use of antibiotics have been excluded from our study. All the cases were from low and medium socioeconomic strata. All the subjects voluntarily participated in the study and informed consent was taken.

The Group B, control group consisted of 50 age matched healthy female volunteers. Fasting venous sample was collected taking all the aseptic precautions and serum was separated. Serum zinc concentrations were analyzed by standard kit provided by Randox [7, 8]. All the test tubes used for analysis were free from any contamination with zinc by initially soaking in 0.1

N. HCL overnight. The analysis was done by semi-auto-analyser. The other investigations were done in the Institutional Laboratory. Statistical analysis was calculated by chi square test and p value < 0.05 was considered statistically significant.

## RESULTS

**Table 1: Study design**

| | Group A (cases) | Group B (controls) |
|---|---|---|
| No. of Cases | 50 | 50 |
| No. of cases taking iron supplementation | 42 | --- |
| No. of cases taking zinc supplementation | Nil | Nil |
| Socioeconomic background | Medium to low | Medium to low |
| No of cases in second trimester | 22 | -------- |
| No. of cases in third trimester | 28 | ------ |
| No. of cases taking daily Calcium supplementation ( 500mg/day ) | 42 | --------- |

**Table 2: Biochemical parameters**

| Parameter | Group A<br>n = 50 | Group B<br>n = 50 |
|---|---|---|
| Mean Serum Zinc Conc.(micro moles/lit) | 3.05 ± 1.44 ** | 6.01 ± 1.15 |
| Mean Hemoglobin (g%) | 11.56 ± 2.38 | 12.45 ± 3.54 |
| Serum Sodium (meq/lit) | 132.43 ± 1.13 | 137.43 ± 1.28 |
| Serum Potassium(meq/lit) | 3.45 ± 0.67 | 3.82 ± 0.78 |

(** = $p < 0.01$)

## DISCUSSION

In our study the mean serum zinc levels in anti-natal (ANC) cases were found to be significantly low as compared to normal healthy female controls. In the study conducted by, Rathi M *et al*. [9] zinc levels in pregnant women and newborns were evaluated. Mean serum zinc levels were found to be low significantly ($p < 0.001$) in normal pregnant women. They have also found corresponding lower zinc levels in newborn babies. In the study conducted by Cavdar AO *et al*. [10] it was found that serum zinc concentration were significantly low in poorly nourished pregnant women compared to controls. In the study conducted by Argemi J *et al*. [11] it was found that serum zinc levels were low significantly in normal pregnant women that in controls. Low serum concentrations of zinc may be due to decreased intake of zinc, or decreased uptake by the intestinal cells during pregnancy or due to increased demands of zinc which is not combated by increasing the nutritious diet during pregnancy. It was seen more so during the 3rd and second trimester of pregnancy indicating the need of zinc supplementation during 2nd and 3rd trimester. Similar results were found by Ajose A, *et al*. [12] who has studied Serum zinc concentrations in women with normal pregnancy. They have found that serum zinc concentration significantly lower ($p < 0.001$) in 84 normal pregnant women than healthy controls. Other reason for lower zinc may be possibly due to hampered absorption of zinc due to interference of calcium [13].Considering the severe complications of calcium deficiency [14, 16]. The pregnant women are routinely supplemented with 500mg/daily calcium after second trimester of pregnancy [13] which is known to interfere with zinc absorption. In our study also 84% of cases are supplemented with calcium.

Zinc is one of the important constituent of proteins associated with control of transcription by the virtue of binding with high affinity to the correct region of DNA. This function is mostly carried out by zinc finger motif like Cystein-cystein-zinc finger and cystein-histidine-zinc finger [15, 16]. Considering the severe consequences like congenital malformations and dysmaturity associated with zinc deficiency [4]. The importance of zinc supplementation cannot be overlooked.

Rich sources of zinc are oysters, beef, liver, crab, seafood, poultry, nuts and seeds, whole grains, tofu, peanuts and peanut butter, legumes etc. The official RDA for pregnant women is 19 milligrams per day. A study indicated that low zinc intake was associated with approximately a two-fold increase in risk of low birth weight, and low zinc intake earlier in pregnancy was associated with more than a trebling of

pre-term delivery [17]. Zinc playing the role of important antioxidant also low concentrations of zinc is hazardous for the developing fetus as it may not satisfactorily reduce the oxidative stress [18, 19]. Studies mentioned that there is increased oxidative stress in pregnancy. It is quite possible that low levels of zinc is one of the contributory factor for increasing the oxidative stress [19].

## CONCLUSION

Our study indicates the need of zinc supplementation during the 2nd and 3rd trimester of pregnancy in such a combination that calcium will not interfere with its absorption.

## REFERENCES


1. Meram I, Bozkurt AI, Ahi S, Ozgur S; Plasma copper and zinc levels in pregnant women in Gaziantep, Turkey. Saudi Med J., 2003; 24(10):1121-1125.
2. Murray RK, Granner DK, Mayes PA, Rodwell VW; Harper's Biochemistry, 25th edition, Appleton and Lange, Stamford, Connecticut, 2000.
3. Kassu A, Yabutani T, Mulu A, Tessema B, Ota F; Serum zinc and copper levels in pregnant and non-pregnant women in Gondar, Northwest Ethiiopia. Biol Trace Elem Res., 2008; 122(2): 97-106.
4. Chen CP; Syndromes, disorders and maternal risk factors associated with neural tube defects. Taiwan J Obstet Gynecol., 2008; 47(2): 131-140.
5. Jameson S; Variations in maternal serum zinc during pregnancy and correlation to congenital malformations, dysmaturity, and abnormal parturition. Acta Med Scand Suppl., 1976; 593: 21-37.
6. Agrawal A, Gupta S, Sekhon L, Shah R; Redox consideration in female reproductive function and assisted reproductionfrom molecular mechanism to health implications. Antioxid Redox Signal, 2008; 10(8): 1375-1403.
7. Makino T, Saito M, Horiguchi D, Kina K; A highly sensitive colorimetric determination ofserum zinc using water soluble pyridylazo dye. Clinica Chemical Acta, 1982; 120(1): 127-135.
8. Homster R, Zak B; Spectrophotometric investigation of sensitive complexing agents for the determination of zinc in serum. Clin Chem., 1985; 31(8): 1310-1313.
9. Rathi SS, Srinivas M, Grover JK, Mitra D, Vats V, Sharma JD; Zinc levels in women and newborns. Indian Journal of Pediatrics, 1999; 66(5): 681-684.
10. Cavdar AO, Babacan E, Arcasoy A, Ertem U; Effect of nutrition on serum zinc concentration during pregnancy in Turkish women. Am J Clin Nutr., 1980; 33(3): 542-544.
11. Argemi J, Serrano, Gutierrez MC, Ruiz MS, Gil A; Serum zinc binding capacity in normal pregnant women. Ann Nutr Metab., 1988; 32(3): 121-126.
12. Ajose A, Fasubaa B, Anetor JI, Adelekan DA, Makinde NO; Serum zinc and copper concentrations In Nigerian women with normal pregnancy. Niger Postgrad Med J., 2001; 8(4):161-164.
13. Chatterjea MN, Shinde R; Textbook of Medical Biochemistry. Jaypee brother's publications. 5th edition, 2002: 544-545.
14. Beinder E; Calcium-supplementation in pregnancy--is it a must? Ther Umsch., 2007; 64(5):243-247.
15. Burtis CA, Bruns DE; Teitz Textbook of Clinical Chemistry and Molecular Diagnostics. 5th edition, Saunders, 2012.
16. Grant WB; High vitamin D and calcium requirements during pregnancy and tooth loss. Am J Public Health, 2008; 98(11):1931-1932.
17. Neuhouser ML, Beresford SAA, Hickok DE, Monsen ER; Absorption of dietary and supplemental folate in women with prior pregnancies with neural tube defects and controls. Journal of the American College of Nutrition, 1998; 17(6): 625-630.
18. Babacan E, Cavdar AO, Arcasoy A, Himmetoglu O; Zinc levels in maternal and cord blood serum during normal deliveries. Prog Clin Biol Res., 1983; 129: 221-226.
19. Atamer Y, Koçyigit Y, Yokus B, Atamer A, Erden AC; Lipid peroxidation, antioxidant defense, status of trace metals and leptin levels in preeclampsia. Eur J Obstet Gynecol Reprod Biol., 2005; 119(1): 60-66.