

## Study of serum zinc status in Bangladeshi women taking oral contraceptives

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### Abstract

**Background:** Birth control pills alter women's reproductive cycle and suppress various endocrine functions. Primary alterations of endocrine functions have secondary effects on other chemical and enzyme functions of the body. A general lowering of the body's nutrient base occurs in women on hormonal contraception. The biochemical profile of oral contraceptive pill user women showed different changes in plasma total protein, albumin and various trace minerals like serum zinc, copper, magnesium etc. Trace minerals are necessary for endocrine function. This study was designed to evaluate serum zinc levels of women taking oral contraceptives.

**Methods:** This cross-sectional study was conducted at Department of Biochemistry, Mymensingh Medical College Hospital from July 2013 to June 2014. A total of 150 subjects were included in this study; among them 50 women were selected as control (Group I), who were neither taking oral contraceptives at the time of selection nor had taken it during prior one year period and 100 women were included as case (Group II), those were taking oral contraceptives. Again Group II was divided as Group IIA included 50 women who were taking oral contraceptives for 3 months duration or less and Group IIB included 50 women who were taking oral contraceptives for 4 months – 5 years duration. Student's unpaired 't' test was used to analyze the data between groups. For analytical purpose 95% confidence limit ( $p < 0.05$ ) was taken as level of significance.

**Results:** In this study, mean  $\pm$  SD of serum zinc was found as  $84 \pm 13.33 \mu\text{g}/\text{dl}$ ,  $57.88 \pm 3.68 \mu\text{g}/\text{dl}$  and  $58.40 \pm 4.59 \mu\text{g}/\text{dl}$  in Group I, Group IIA and Group IIB respectively. Serum zinc was significantly low in both Groups IIA and IIB in comparison to Group I ( $p < 0.001$ ).

**Conclusion:** In this study serum zinc level was significantly lower in women taking OCP in comparison with control individuals who were not taking any hormonal contraceptive.

**Keywords:** oral contraceptive pills, trace minerals, zinc.

(BIRDEM Med J 2020; 10(1): 12-15)

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**Received:** March 2, 2019

**Accepted:** October 31, 2019

### Introduction

Contraceptives are the devices or techniques that permit sexual union without resultant pregnancy.<sup>1,2</sup> The most popular contraceptives are oral contraceptive pill (OCP) and injectable hormonal contraceptives among the all contraceptive devices.<sup>3</sup> In Bangladesh among the available modern methods of contraceptives about 30% couples use OCP<sup>4</sup> and 12.4% couples use injectable contraceptive.<sup>5</sup> OCP stop ovulation, prevent the ovaries from releasing eggs, they also thicken cervical mucosa, making it harder for sperm to enter the uterus.<sup>6</sup>

Injectable contraceptives include depo-medroxy progesterone acetate (DMPA), norethisterone enanthate

(NET-EN) and combined injectable contraceptives of different combination of estragens and progestins that are given monthly.

There has been interest in recent years about alteration in various metabolic processes and trace element profiles associated with the use of various contraceptives. The oral and injectable contraceptives fulfill the human need for birth control. Many biochemical parameters of women taking these contraceptives are disturbed due to metabolic alteration induced by hormone content. Zn is an important essential trace element present in all body tissues and fluids needed for catalytic, structural and regulatory functions in the body.<sup>7</sup> It is intimately involved in the maintenance of the immune function.<sup>8</sup>

Previous studies have been done on the Zn status among the gestational diabetes mellitus (GDM) and post-menopausal women and the researchers found alteration the serum Zn level.<sup>9,10</sup> The significance of Zn in menopausal nutrition and public health was recognized relatively recently.<sup>10</sup> Another study had revealed that there is pronounced alteration of serum Zn level in GDM cases compared to normal pregnancy.<sup>9,11</sup> Women on different contraceptive methods have been linked with the development of various diseases and possible changes in serum trace elements and vitamins of women on contraceptives have been postulated.<sup>12-14</sup> Alterations in metabolic processes and trace element profiles are governed by genetic disposition as well as environmental factors. Changes in lifestyle, environmental factors, dietary habits and active ingredients of hormonal agents have been known to affect status of micronutrients in humans.<sup>2,12</sup> Zn deficiency is a serious problem in developing countries. Many studies have shown the adverse effects on growth and morbidity as well as the prevention of infection by Zn supplementation.<sup>15</sup>

Aim of this study was to evaluate the serum level of zinc (Zn) in apparently healthy women who were taking OCP and to compare with Zn level of healthy non-contraceptive users.

## Methods

This cross-sectional study was conducted at Mymensingh Medical College Hospital from July 2013 to June 2014. A total of 150 subjects were included in the present study. Age distribution of subjects of the present study was 22-35 years. Subjects were classified

into three groups. Group I comprised of 50 women as controls (neither taking oral contraceptives at the time of selection nor had taken it during previous one year period). Group IIA included 50 women who were taking oral contraceptives for 3 months duration (3 months group or less). Group IIB included 50 women those were on oral contraceptives for 4 months – 5years duration. Serum Zn was determined by colorimetric method with 2-(5-Brom-2-pyridylazo)-5-[-N-propyl-N-(3-sulfopropyl) amino]-phenol as per manufacturer's instruction. The study protocol was approved by the institutional review committee and written informed consent was obtained from all the participants prior to their enrolment into this study. The results were analyzed and values were expressed as mean  $\pm$ SD. The level of significance was determined by employing Student's t test. Only when the p value was less than 0.05, the difference between two groups and subgroups were considered as statistically significant.

## Results

Age distribution of subjects of the present study was shown in Table I with minimum age 20 and maximum as 35 years. In the present study, different side effects of oral contraceptives in users were recorded in Table II. Majority users (76%) complained of headache followed by burning sensation all over the body associated with numbness and tingling as well as scanty loss during menstruation (10%). Above 65% of users had excessive vaginal discharge along with lower abdominal pain. Anorexia and nausea was complained by >60% users. In this study mean serum Zn were  $84 \pm 13.34$   $\mu$ g/dl,  $57.88 \pm 3.68$   $\mu$ g/dl and  $58.40 \pm 4.59$   $\mu$ g/dl in Group I, Group IIA and Group IIB respectively. Mean  $\pm$ SD of serum Zn was significantly ( $p < 0.001$ ) lower in Group IIA and Group IIB when they were compared with Group I (Table III & IV).

**Table I** Comparison of the age distribution between different groups (N=150)

Age (years)	Group I (50)	Group IIA (50)	Group IIB (50)
20-25 (n=37)	15	10	12
26-30 (n=58)	15	20	23
31-35 (n=55)	20	20	15
Total (n=150)	50	50	50

**Table II** Observed side effects of oral contraceptive in 100 users

Side effects	Number	Percentage
Anorexia and nausea	62	62
Headache	76	76
Lower abdominal pain & vaginal discharge	68	68
Burning, numbness and tingling	72	72
Raised blood pressure	11	11
Break through bleeding / spotting	10	10
Scanty menstrual loss	15	15

**Table III** Comparison of serum Zinc in Group I and Group IIA

Comparison of Zinc	Group I Mean $\pm$ SD	Group IIA Mean $\pm$ SD	p value
Serum Zinc ( $\mu$ gm/dl)	84 $\pm$ 13.34	57.88 $\pm$ 3.68	<0.001

Unpaired 't' test(<0.05=significant;<0.001=highly significant.)

**Table IV** Comparison of serum Zinc in Group I and Group IIB

Comparison of Zinc	Group I Mean $\pm$ SD	Group IIB Mean $\pm$ SD	p value
Serum Zinc ( $\mu$ gm/dl)	84 $\pm$ 13.34	58.40 $\pm$ 4.59	<0.001

Unpaired 't' test(<0.05=significant;<0.001=highly significant.)

### Discussion

In the present study, different side effects of OCP in users were recorded. Side effects of OCP were similarly described in many reviews and texts.<sup>16-19</sup> These types of minor side effects might occur due to systemic action of synthetic estrogen and progestin contained in OCP. Most of these side effects are self-limiting and disappear spontaneously when body system become adjusted with the hormone level.<sup>18</sup> Researches had been continuing for many decades to explore risk versus benefits of different contraceptive methods.

In this study, serum Zn was significantly low in case groups when compared with control group. Ynsaet *al.* and Holt also reported that serum Zn was lower among those study subjects in women using contraceptives.<sup>20,21</sup> The physiological implications of the alterations in serum Zn levels in women using OCP are not well documented. OCP may alter the post-absorptive utilization of Zn.<sup>21,22</sup> Circulating Zn level may be reduced while some tissue level may be increased. Also the release of Zn from tissues may be depressed in OCP users.<sup>11,23</sup>

Adequate Zn level is believed to be important in immune function. Zn exerts a number of indirect antioxidant functions and its deficiency can decrease the response to insulin, possibly by increased oxidative stress, apoptosis and inflammation.<sup>24</sup> Thus, the low level of Zn reported in our study consequent to OCP intake may promote Zn deficiency which may have negative impact on immune function and integrity and nutritional status of OCP users.<sup>23,24</sup>

### Conclusion

The present study has revealed that there is pronounced alteration of serum Zn individuals on OCP, when compared with the control group. As a preliminary study, our data may raise enthusiasm and interest in future researcher for studying with trace minerals.

**Conflict of interest:** Nothing to declare.

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