

## Determination of Estrogen hormone in normal healthy non pregnant women of different age in Tikrit city.

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### Abstract

**Background:** Estrogen have many important functions regarding the genital tract, central nervous system, the breast, the development of the secondary sex characteristics and many other functions the most important here is its effect on the bone by increasing deposition of bone and its role in epiphysial closure.

**Aims:** The aim of the study is to determine serum estrogen concentration in normal healthy non pregnant women in Tikrit city.

**Subjects & Methods:** This study was carried out during a period extending from January to July 2012 in Tikrit University. Two hundred normal healthy women were participated in this study, their ages from 20 up to 65 years. About five ml blood was drawn from each participant using a tourniquet, and then blood sample was put into plan tube without anticoagulant for serum separation. Serum estrogen was measured by using kit from Roche (Germany) which was used on cobas e 411 analyzers –disk system.

**Results:** The first group aged 20 to 29 years has a serum estrogen concentration of  $939 \pm 78$  pg/ml, this group of women have the highest serum estrogen concentration as compare with other groups ( $P \leq 0.01$ ). Also, there is significant reduction in serum estrogen concentration in group aged 30-39 years ( $377.42 \pm 28.4$  pg/ml) as compare with group 20-29 years ( $939 \pm 78$  pg/ml). Moreover, there is significant reduction in serum estrogen concentration in group aged 40-49 years ( $168.07 \pm 29.3$  pg/ml) as compare with group 20-29 years ( $939 \pm 78$  pg/ml). Furthermore, there is significant reduction in serum estrogen concentration in group aged 50-59 years ( $53.16 \pm 13.4$  pg/ml) as compare with group 20-29 years ( $939 \pm 78$  pg/ml). Meanwhile, there is significant reduction in serum estrogen concentration in women group aged above 60 years ( $28.4 \pm 7.4$  pg/ml) as compare with group 20-29 years ( $939 \pm 78$  pg/ml).

**Conclusion:** The present study concludes that there is significant reduction in serum estrogen in women as advance in age. The most sever reduction in age group above 50 years. The present study recommend the followings;- Regular assessment of serum estrogen in women above 45 years & study the relation between reduction in serum estrogen & bone density in women.

**Key words:** Serum estrogen, fertile women, postmenopausal women

## **Introduction**

Estrogen is a steroid hormone secreted from the ovary during normal reproductive life of female, this hormone have two peaks of secretion one just before ovulation and the other during the midluteal phase (1). After menopause estrogen level decline to low levels (2). Estrogen have many important functions regarding the genital tract, central nervous system, the breast, the development of the secondary sex characteristics and many other functions the most important here is its effect on the bone by increasing deposition of bone and its role in epiphysial closure (3). So, the decline in estrogen level during menopause leads to decrease bone density and thus lead to osteoporosis. .

In a large population-based study, it was demonstrated that women aged 65 yr or older with serum estradiol levels between 10 and 25 pg/ml, (4). Furthermore, women with undetectable serum estradiol levels had a significantly increased risk of hip and vertebral fractures compared with those with levels above 5 pg/ml, and this risk was further increased in the presence of high serum concentrations of sex hormone binding globulin, (5,6,7).

The aim of the study is to determine serum estrogen concentration in normal healthy non pregnant women in Tikrit city.

## **Subjects & methods**

This study was carried out during a period extending from January to September 2012 in Tikrit University. Two hundred normal healthy women were participated in this study. Informed written consent was taken from all subjects after explanation of aim of the study. In the present study only non pregnant women were included in the study.

About five ml of blood was drawn from each participant, and then blood sample was put into plan tube without anticoagulant for serum separation.

Serum separation done by centrifuging the clotted blood samples using a centrifuge 3000 rpm for 10 minutes and separate the serum by using micropipette & serum stored in a deep freeze (-18°C) for further analysis.

Serum estrogen was measured by using kit from Roche (Germany) which was used on cobas e 411 analyzers –disk system, from Roche Diagnostic (Germany). The electrochemiluminescence immunoassay "ECLIA" is intended for use on Elecsys and cobas e immunoassay analyzers, (8-9).

## **Statistical analysis**

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All data were presented as a mean & standard deviation (SD). P values less than 0.05 was accepted as significant values. Unpaired student T test was used to compare between the mean of measured parameters. Percent of reduction was calculated for each group with group aged 20-29 years.

### Results

Two hundred normal healthy women were participated in this study, their ages from 20 up to 65 years.

Table 1 & figure 1 shows the distribution of subjects according age into five subgroups;-

Table 2 shows the mean & standard deviation of body mass index (BMI) of all subjects. There is increase in BMI in older women at age group 30-39, 40-49, 50-59 & women above 60 years as compare with age group 20-29 years, ( $P \leq 0.05$ ).

Table 3 & figure 2 show the mean & standard deviation of serum Estrogen hormone (pg/ml) & percent of reduction in normal according to the age distribution.

The first group aged 20 to 29 years has a serum estrogen concentration of  $939 \pm 78$  pg/ml, this group of women have the highest serum estrogen

concentration as compared with other groups ( $P \leq 0.01$ ).

Also, there is significant reduction ( $P \leq 0.05$ ) in serum estrogen concentration in group aged 30-39 years ( $377.42 \pm 28.4$  pg/ml) as compared with group 20-29 years ( $939 \pm 78$  pg/ml).

Moreover, there is significant reduction ( $P \leq 0.05$ ) in serum estrogen concentration in group aged 40-49 years ( $168.07 \pm 29.3$  pg/ml) as compare with group 20-29 years ( $939 \pm 78$  pg/ml).

Furthermore, there is significant reduction ( $P \leq 0.05$ ) in serum estrogen concentration in group aged 50-59 years ( $53.16 \pm 13.4$  pg/ml) as compare with group 20-29 years ( $939 \pm 78$  pg/ml).

Meanwhile, there is significant reduction ( $P \leq 0.05$ ) in serum estrogen concentration in women group aged above 60 years ( $28.4 \pm 7.4$  pg/ml) as compare with group 20-29 years ( $939 \pm 78$  pg/ml).

Table 4 & figure 3 show the distribution of 46 women aged 20 to 29 according to gravida. There is significant reduction in grand multi gravid ( $745 \pm 67.4$  pg/ml) as compare with primi ( $849 \pm 92.8$  pg/ml) & and with multigravid ( $956 \pm 85.7$  pg/ml)

## **Discussion**

In the normal non pregnant women, estrogens are secreted in significant quantities only by the ovaries, although minute amounts are also secreted by the adrenal cortices. While, during pregnancy, tremendous quantities of estrogens are also secreted by placenta, (1-3).

Only three estrogens are circulating in the bloodstream of human female:  $\beta$ -estradiol, estrone and estriol. The normal ratio of these three types of estrogens ideally should be 10–20%, 10–20%, and 60–80% respectively. The estrogen that accounts for most of the tissue stimulation is called estradiol. Estrone is a little bit less potent with estriol being the weakest, (4-5).

These three estrogens are secreted primarily by the granulosa cells of the ovarian follicles, the corpus luteum, and the placenta. Their biosynthesis depends on the enzyme aromatase, which converts testosterone to estradiol and androstenedione to estrone. The latter reaction also occurs in fat, liver, muscle, and the brain, (1-3).

In the present study, there is decrease in serum estrogen concentration as advance in age. Moreover, there is 90% reduction in serum concentration in age

group above 50 years as compare with age group 20 years. This reduction in serum estrogen concentration due to reduction in ovaries reserve & may be ovulation stop (postmenopausal period), (10). Also, estrogens are transported in the blood bound mainly with plasma albumin and with specific estrogen - binding globulins, (1).

The estrogens mainly promote proliferation and growth of specific cells in the body that are responsible for the development of most secondary sexual characteristics of the female, it is also stimulate bone growth so that osteoporosis of the bones caused by estrogen deficiency after menopause, almost no estrogens are secreted by the ovaries, (10-11).

At that time estrogen act as a feedback messenger to inhibit the release FSH and stimulate the release of LH from the pituitary, this LH cause s ovulation and change the ruptured follicle into the corpus luteum, which produce estrogen and progesterone, (1-3).

**The present study concluded** that, there is significant reduction in serum estrogen in women as advance in age. The most sever reduction in age group above 50 years.

**The present study recommend the followings:-**

## Determination of Estrogen hormone in normal healthy non pregnant women of different age in Tikrit city.

1-Regular determination of serum estrogen in women above 45 years.

2-Study the relation between reduction in estrogen & bone density in women.

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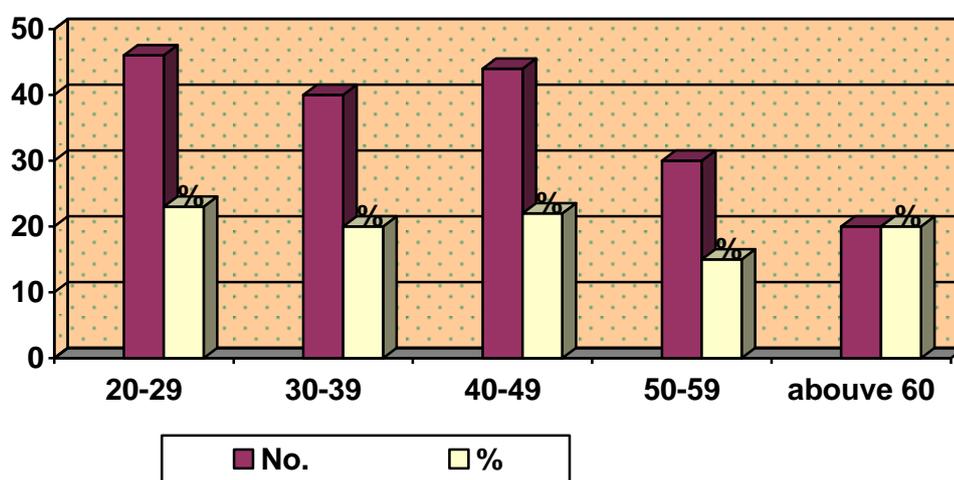
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**Table 1: Distribution of normal women according to the age groups.**

| Age (years)  | Normal Women |              |
|--------------|--------------|--------------|
|              | Number       | Percentage % |
| 20- 29       | 46           | 23           |
| 30- 39       | 40           | 20           |
| 40-49        | 44           | 22           |
| 50-59        | 30           | 15           |
| Above 60     | 40           | 20           |
| <b>Total</b> | 200          | 100%         |



**Figure 1** shows distribution of women according to age groups

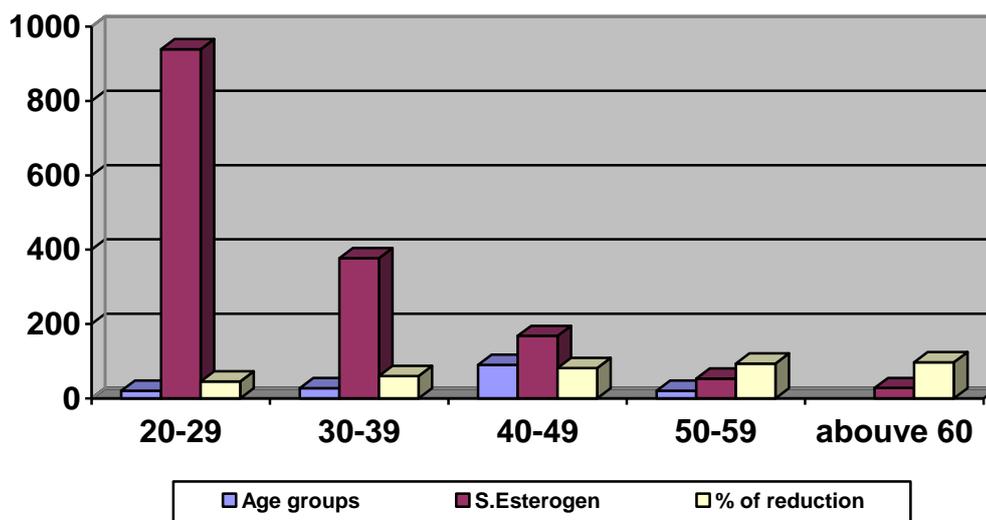
**Table 2** shows the mean & standard deviation of body mass index (BMI) of subjects.

| Age groups<br>(Years) | BMI<br>(Kg/M <sup>2</sup> ) | P value<br>≤ |
|-----------------------|-----------------------------|--------------|
| 20-29                 | 21.37 ± 4.1                 |              |
| 30-39                 | 29.05 ± 6                   | 0.01         |
| 40-49                 | 32.3 ± 5.4                  | 0.01         |
| 50-59                 | 34.5 ± 6.9                  | 0.01         |
| Above 60              | 33 ± 6.8                    | 0.01         |

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**Table 3** shows the mean & standard deviation of serum Estrogen hormone.

| Age groups<br>(Years) | Serum Estrogen<br>E2 (pg/ml) | % of reduction | P value |
|-----------------------|------------------------------|----------------|---------|
| 20-29                 | 939 ± 78                     |                |         |
| 30-39                 | 377.42 ± 28.4                | 59.8           | 0.05    |
| 40-49                 | 168.07 ± 29.3                | 82.1           | 0.01    |
| 50-59                 | 53.16 ± 13.4                 | 94.4           | 0.01    |
| Above 60              | 28.4 ± 7.4                   | 97.02          | 0.01    |

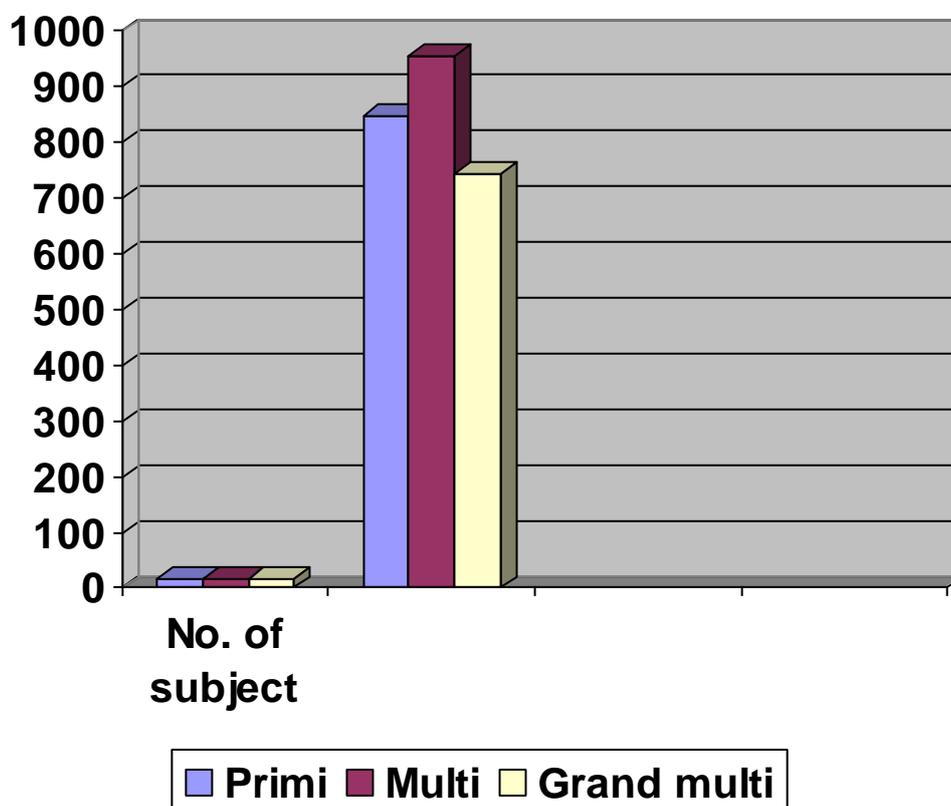


**Figure 2** shows the mean & standard deviation of serum Estrogen hormone

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**Table 4:** The Mean & Standard Deviation of Estrogen Hormone (pg/ml) in normal women according to the gravidity as; prime gravid, Multi gravid, Grand multi gravid.

| Gravidity   | Number of subjects | Serum Estrogen (pg/ml) |
|-------------|--------------------|------------------------|
| Primi       | 16                 | 849 ± 92.8             |
| Multi       | 15                 | 956 ± 85.7             |
| Grand multi | 15                 | 745 ± 67.4             |
| Total       | 46                 | 939 ± 78               |



**Figure 3:** The Mean & Standard Deviation of Estrogen Hormone (pg/ml) in normal women according to the gravidity