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COMPARISON OF SERUM TESTOSTERONE AND PROGESTERONE LEVELS IN SURGICAL AND NATURAL MENOPAUSE

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ABSTRACT

Background: Natural menopause is a physiological process which occurs around the age of 45 – 55 years. Surgical menopause is not physiological, occurs through an operative procedure which leads to sudden hormonal imbalances. Both the groups whether natural or surgical menopause experience hot flushes and mood swings, but this happens gradually in natural menopause and suddenly in surgical menopause. These symptoms may be correlated to the sudden hormonal imbalances

Aim: To study and compare hormonal levels of Progesterone and Testosterone in Surgical and Natural menopause

Settings and Design: Prospective Study

Methods and Material: 50 women (cases) belonging to surgical menopausal group and 50 women (controls) were belonging to Natural menopausal group.

The hormonal parameters (Progesterone and Testosterone) were measured by Solid Phase Competitive Chemilumniscent Enzyme Immunoassay.

Statistical analysis used: Student's t-test was used to compare mean serum concentrations of Progesterone. Mann - Whitney U Rank Test was used to compare mean testosterone values

Diagramatic Representation : 1] Dot – Plot graphs were used to show significance as per results of t – test. 2] Bar diagrams were used to show mean values of various parameters of this study in surgical and natural menopause

Results: The mean level of progesterone hormone in study group was found to be 0.71±0.57 while that in control group was 2.074±0.42. Mann- Whitney U Rank Test was used to compare mean testosterone values which showed significant difference between both the groups of surgical and natural menopause.

Conclusion**:** In natural menopause the hormonal imbalance occurs gradually over a period of time but in surgical menopause the hormonal levels change abruptly. These sudden changes in the hormonal level may be responsible for severe hot flushes, headaches, mood swings and atherosclerosis.

Key words: Serum testosterone, serum progesterone, surgical menopause, natural menopause, chemiluminiscence

INTRODUCTION

Progesterone is secreted mainly by corpus luteum. Partly metabolized to estrogen and partly to testosterone .It also have many significant actions such as secretory hypertrophy of endometrium , myohyperplasia of uterus ,inhibit production of FSH and causes sodium retention and relaxation of smooth muscles[1]. Fifty percent testosterone is secreted by adrenal gland and remaining secreted in ovaries by all three types of cells i.e stroma, theca & granulosa but mainly by the theca interna cells of ovarian follicles. 80-85% testosterone are bound to sex – hormone binding protein , 10 -15 % to albumin and remaining 1- 2% remains free which is responsible for its action at peripheral targets mainly hair growth and acne[1].Menopause is defined as that point in time when permanent cessation of menstruation occurs following loss of ovarian activity.[2] It takes 12 months of amenorrhoea to

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confirm that menopause has set in and so it is retrospective diagnosis.[3] ***Surgical menopause*** is the cessation of menses resulting from surgical removal of the uterus, leaving one or both ovaries, or the removal of both ovaries.[4]

MATERIALS AND METHODS

Cases : Fifty women belonging to surgical menopausal group

Control : Fifty women belonging to Natural menopausal group.

Inclusion Criteria

1. Women aging between 44 to 50 years who have undergone Total Hysterectomy in past one to two years.
2. Women aging between 44 to 52 years who are experiencing natural menopause since past one to two years.

Exclusion Criteria

1. Hormonal intake in any form
2. Endocrine disorders
3. Testosterone secreting tumors.

We used fully automated enzyme amplified chemiluminescent immunoassay based Immulite 1000 analyzer. The solid phase(bead) is coated with rabbit anti-hormonal polyclonal antibody. The reagent contains alkaline phosphatase conjugated to respective hormone. This hormone-enzyme conjugate competes with respective hormone in patients' blood sample for limited antibody binding sites on bead. The excess sample and reagent are removed by centrifugal wash. Finally chemiluminiscent substrate is added to the bead and signal is generated in proportion to the bound enzyme.

RESULTS

Table 1: Reference Values as per Siemens diagnostic kit insert

Total Testosterone	ND – 43 ng/dl
Progesterone	ND – 11 ng/ml

Progesterone: On applying independent (Unpaired) sample t – test, the difference in mean progesterone level between both the groups was found to be very significant with p value < 0.001. (Table – 2 & Figure – 1)

Table 2: Serum mean Progesterone Level of surgical and natural menopausal females

Serum mean Progesterone Level of surgical and natural menopausal females				
Menopause	N	Mean Progesterone [ng/ml]	Standard Deviation [ng/ml]	Standard Error [ng/ml]
Surgical	50	0.71	0.57	0.08
Natural	50	2.074	0.42	0.06
Mean Difference= -1.364 [ng/ml]				
Independent Sample t test:- t value -13.63, df-98, p value <0.001				

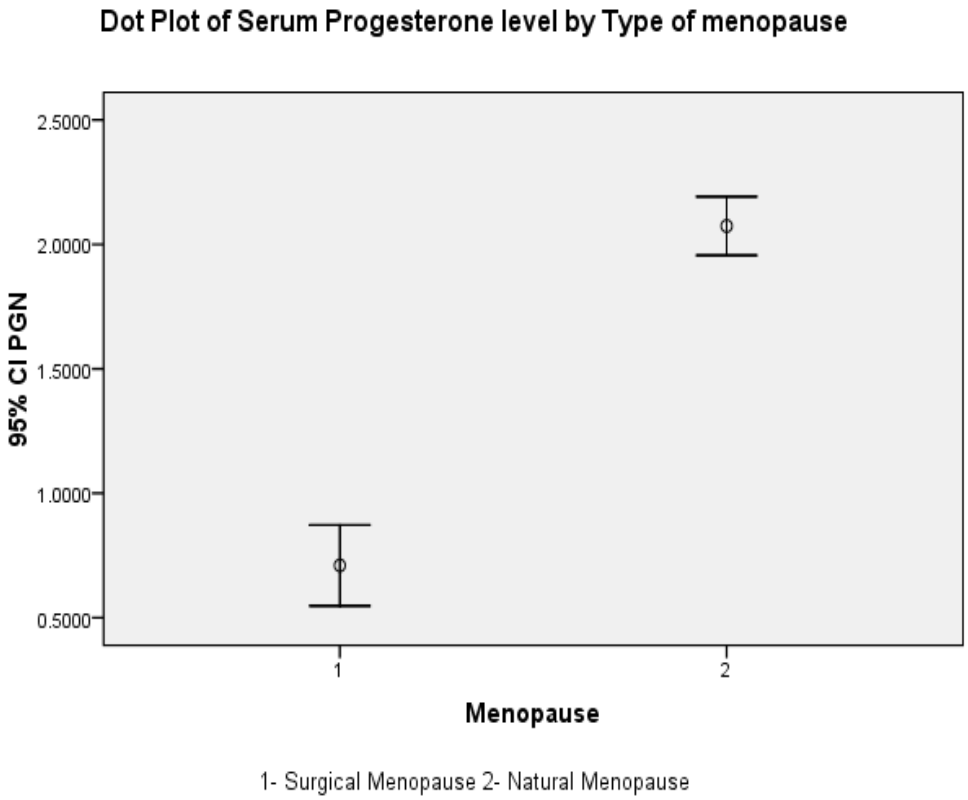

Figure 1: Dot Plot of serum progesterone level by type of menopause

Testosterone : In this study Mann- Whitney U Rank Test was used to compare mean testosterone values which showed significant difference between both the groups of surgical and natural menopause. (Table 3 & Figure 2)

Table 3: Serum mean Testosterone level of surgical and natural menopausal females

Serum mean Testosterone level of surgical and natural menopausal females							
Ranks					**Test Statistics**		
	Menopause	N	Mean Rank	Sum of Ranks	Mann-Whitney U	p Value	Inference
Serum Testosterone Level	Surgical	50	43.05	2152.5	877.5	0.01	Significant Difference.
	Natural	50	57.95	2897.5			

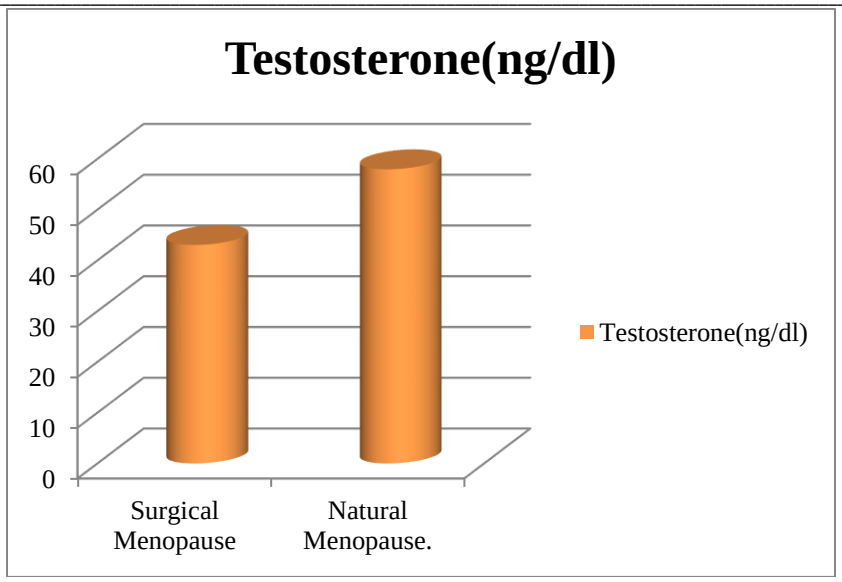

Figure 2: Testosterone levels in surgical and natural menopause

DISCUSSION

In the present study, the serum progesterone levels in surgical menopausal women from 1 to 2 years after surgery was lower than that in the post-menopausal women at similar periods after natural menopause. This indicates that some ovarian progesterone secretion may be sustained for a few years after natural menopause. Similar finding were suggested by Nobuaki Furuhashi *et al.,* [5] who reported significantly decreased levels of progesterone within 2 years after surgical menopause as compared to their levels in natural menopause. As ovary is the major site of synthesis and secretion of estradiol and progesterone in the mammals.[6,7] This might be the reason of significant decrease in progesterone secretion in surgical menopause than that of natural menopause as surgical menopause is characterized by faster onset of ovarian dysfunction.[8,9] Present study also reported significant decrease in testosterone levels of surgical menopausal women as compared to its level in natural menopausal women. This view was supported by S. L. Davison *et al.*,[10] who reported that surgical menopausal women had significantly lower testosterone levels than women in the reference group of natural menopause. Similar findings were also suggested by A. Vermeulen *et al.,* who reported significant decrease in testosterone levels in surgical menopause as compared to natural menopause.[11] Gail A. Laughlin *et al.,* reported 40% decrease while Hughes.[12] CL Jr. *et al.,* reported 50% decrease in testosterone levels in surgical menopause.[13] Significant decrease in testosterone levels in surgical menopause was also revealed by Taylor . M *et al.,* who concluded that this decrease is associated with destabilization of psychiatric axis in women with surgical menopause.[14] In women, testosterone is produced primarily through peripheral conversion of androstenedione (50 percent) with the remainder of production concentrated in the ovary (25 percent) and adrenal cortex (25 percent). [15] Women with surgical menopause have decreased levels of testosterone because production in this condition relies primarily on the adrenal cortex and peripheral conversion of androstenedione[16] while in natural menopause ovary still appears to be source of testosterone.[10] It has also been shown that testosterone levels do not fall abruptly in women undergoing natural menopause due to the preservation of androgen producing theca cells.[17,18] Evidence that a simple hysterectomy hampers ovarian function is proved in various studies.[19-23] Increased bone loss after premenopausal hysterectomy [24] as well as cardiovascular disease,[25] both conditions associated with ovarian failure has been reported. By blocking the circulation of the uterine vessels , hysterectomy can reduce ovarian blood flow,[26] which may result in loss of follicular reserve and premature menopause.[20,22]

CONCLUSION

In the present study, Progesterone and Testosterone were significantly decreased in Surgical menopause

as compared to natural menopause. The sudden change in these hormone levels may be responsible for the increased severity of hot flushes or mood swings seen in the surgical menopausal women as compared to natural menopausal women.

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