



## Effect of Physical Exercise on Female Hormone

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### Abstract:

Evidence suggested that exercise may change, level of secretion of female hormones such as: Prolactin, Luteinizing, Follicle Stimulating, Estrogen and Progesterone. The researcher intends to concentrate on the function of various female hormone with sources of secretion, method of hormonal test and various problems of female. The prolactin hormone is secreted from anterior pituitary gland and its main function is milk secretion. Pituitary gland secreted Luteinizing hormone and complete development of ovarian follicle to secretary stage and secretion of estrogen are maintained by this hormone. Sources of follicle stimulating hormone is the anterior pituitary hormone gland and it's work is regulating of human reproductive system, progesterone and menstrual cycle. Estrogen is secreted form ovary and it is responsible for puberty changes, proliferation stages of menstruation, growth of uterus during pregnancy, exert synthesis action with oxytosin. Progesterone hormone comes from Carpus lutem, Placenta, Adrenal Cortex and it is responsible for premenstrual change of uterine mucosa. One of the best hormonal tests for basal level of PRL, LH, FSH, estrogen and progesterone is Chemiluminescence immunoassay (CLIA). Following an overnight fasting venues blood sample were taken via a disposable plastic syringe inserted into an antecubital forearm vein. Blood (3ml) was allotted to colt for one hour in a plain test tube(burocell) and then centrifuged (REMI) at 30° Celsius for 5 minutes at 6000 rev min<sup>-1</sup> to separate the serum form the cell before proceeding with CLIA test. Infertility, irregular menstrual cycle, decreases in sex drive, unable to breast feeding after child birth are the common problem due to imbalance in female hormonal secretion.

**Key Words:** Exercise; Female; Hormone.



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**Introduction:** From the various sources of review it is found that exercise may change level of secretion of female hormones such as: Prolactin [1-6] Luteinizing [7-15] Follicle Stimulating [1-6, 16] Estrogen [17-22] and Progesterone [16-23].

The researcher intend to concentrate on the function of various female hormone with sources of secretion, method of hormonal test and various problems of female. **Hormone:** Hormone is a chemical substance secreted into the body fluids by endocrine glands and has a specific effect on the objective of other organ [24-32]. A hormone is a class of regulatory biochemical that is produces in all multi cellular organism by gland and transports by the circulatory system to a distant target organ to co ordinate it physiology and behavior. Hormone serves as a major form of communication between different organ and tissues. Hormones regulate variety of physiological and behavioral activity includes digestion, metabolism, respiration, tissue function, sensory preparation, sleep, excretion, lactation, stress, growth and development movement, reproduction, and mood. Generally, only a small amount of hormone is required to alter cell metabolism.

**Physiological function of hormones:** 1. Hormone promotes growth and development of all body, tissue, bone, and muscle. 2. It controls growth and metabolism of carbohydrate, fat, protein. 3. It decrease rate of carbohydrate use. 4. It helps in development of female and male sex. 5. Regulating calcium metabolism. 6. Maintain Blood pressure and blood flow, and contraction ability of heart. 7. Increase oxygen consumption. 8. Control glucose level. 9. Regulating female menstrual cycle. 10. Control milk production. 11. It helps pain relief.

**Psychological function of hormone:** 1. Control depression and anxiety. 2. Regulating moods and behavior. 3. Control emotion. **Prolactine hormone:** Prolactin is recreated from the mammotrophs of anterior pituitary and is a protein with 198 amino acids. It has similarly with human chorionic somatotrophin. Its secretion is pulsatile, *i.e.*, shows no fixed plasma level (2 to 15 ng/ml, females have higher values than males). It helps in the development of the mammary glands. After childbirth, when estrogen and progesterone levels become low, PRL helps in initiation and maintenance of lactation with the help of other hormones like insulin, thyroxin, cortisol, etc. It also helps in the synthesis of the milk proteins. prolactin inhibits synthesis and secretion of GnRH and leads ammenorrhoea (no menstruation). As PRL secretion is high in lactating women (for lactation), lactational ammeorrhoea is a rule. It also blocks the actions of the gonadotrophins on the ovaries. All these lead to prevention of pregnancy in a lactating woman (natural contraception). PRL secretion in male is like that in non-pregnant woman but its function in male is not known. High amount of PRL in man leads to impotence and in females (those who are not pregnant or lactating) leads to ammenorrhoea and infertility. Prolactin secretion is stimulated by PRH (prolactin releasing hormone) from hypothalamus. It is also stimulated by TRH, dopamine antagonists like chlorpromazine etc. PRL level is higher



during pregnancy. It decreases rapidly after childbirth and then increases during suckling by the baby. PRL secretion also increases during sleep, exercise, etc. PRL secretion is inhibited by PIH (prolactin inhibitory hormone) from the hypothalamus. PIH is actually dopamine and is under feedback regulation by PRL. Dopamine agonists, like bromocriptine, inhibit PRL secretion [33-42].

**Luteinizing hormone:** Luteinizing hormone Secreted by pituitary gland. Complete development of the ovarian follicle to secretary stage and secretion of estrogen. Rupture of the follicles and ovulation due to combined action of FSH and LH causes appearance growth and persistence of corpus luteum. In ovary LH can stimulate the non germinal element to produce androgens, testosterone etc, giving rise to hirsutism, after menopause a 5 fold increase of LH.

**Follicle stimulating hormone:** Follicle stimulating hormone a gonadotrophic hormone secreted from the anterior pituitary gland that stimulating maturation of ovarian follicle in female mammals and grow of the seminiferous tubules in males and regulating of human reproductive system, estrogen, progesterone and menstrual cycle increase number and size of graafian follicles and prepares them ovulation.

**Estrogen hormone:** Estrogen is compounds which can produce oestrus in ovariectomised animal.

**Verities of Estrogen hormone:** 1) Oestradiol: It is a hormone secreted by ovary. 2. Oestrial: It is found in adult female urine and increased during pregnancy, is also liberate from placenta.

**Source of estrogen hormone:** 1. Ovary is the chief source: (a) from graafian follicles, (b) from the ovarian interstitial cell. 2. Adrenal cortex: Estrogen has been extracted from this gland. 3. Testes: small amount of estrogen have been from this gland. 4. Placenta: It is main source during pregnancy.

**Function of estrogen:** 1. Responsible for puberty changes: a) Growth of uterus, vagina stratification of vaginal epithelium. b) Increase contractibility, secretion and ciliary movement of the fallopian tube. c) Development of breasts chiefly by proliferation of ducts. d) Menstrual changes. e) Appearance of secondary sex characters. 2. Responsible for proliferation stage of menstruation. 3. Causes growth of uterus during pregnancy: The enormous growth of uterus is believed to be due to estrogens aided by the mechanical stimulating of the growing embryo. 4. Exert synthesis action with oxytocin: It has been show that estrogen increases the sensitiveness of the uterine musculature to the action of oxytocin while progesterone dresses it. At the full term progesterone levels fall due to degeneration of corpus luteum and to some extent of the placenta. But estrogen level still remains high. This is enhancing oxytocin effect and the parturition stages.

5. Relating with progesterone and corpus luteum: a) Estrogen and progesterone act synergistically. b) Progesterone can premenstrual changes in the endometrium only after the proliferation changes has been already done by estrogen. Progesterone will have no effect. Breast formation during pregnancy only occurred by their combined action. c) They may be antagonists: in large doses, estrogen antagonizes the action of progesterone and prevents the progestational changes in the uterine mucosa. d) estrogen is also necessary for the maintains of corpus luteum during pregnancy. Probably this is brought about through the action of anterior lobe of



hypothesis. 6. Inhibits the secretion of anterior pituitary the FSH. In this way anterior pituitary and ovary maintain a reciprocal relationship. Due to this inhibitory action, administration large closer of estrogen may cause atrophy of ovaries, arrest menstruation produce sterility. Estrogen have no direct action on the gonads, they work by inhibits the follicle stimulating hormone of anterior pituitary hormone. 7. Inhibits thymus: Estrogen depress thymus and causes its involution puberty. 8. Exerts synthesis action with androgen. In male estrogen is physiological doge acts synergistically with androgen and help in the development of secondary sex characters. 9. Stimulate of ACTH form the anterior pituitary and causes hypertrophy of adrenal cortex. 10. Help water balance: Administration of estrogen cause water sodium chloride retention, increase of blood volume and the water content of muscle. Ooperectomy on the other hand cause loss of water and admonish blood volume. They are all restore to normal by administration of estrogen. 11. Effect of protein synthesis: estrogen increase total body protein as indicated by positive hydrogen balance. The effect is however much less than that of testosterone. 12. Effect of bone growth: Estrogen induces positive calcium balance and increase skeletal growth. 13. Effect of fat deposition: Estrogen cause increase deposition of fat in subcutaneous tissue and also in other particular region of male a typical feminine body. 14. Effect of cholesterol metabolism: Possibility by it action on lipoproteins, estrogen lower plasma cholesterol level. 15. The estrogen is responsible for the development of female secondary sex characteristics that distinguish the female from male. 16. For several decades many investigator contented that estrogen induce breast cancer. Prolactin is now suspect, not estrogen stimulate prolactin secretion and mammary development only in the presence of pituitary gland. **Progesterone hormone:** Progesterone is a hormone involved in the female menstrual cycle pregnancy, and embryogenesis of human and other spices. Williard Myron Allen discover this hormone in 1933. **Source:** Carpus lutem, Placenta, Adrenal cortex are main source of progesterone. (a) Responsible for premenstrual change of uterine mucosa. (b) Take an essential part of pregnancy. If corpus lutea be removed after embedding of the ovum, placenta fails to development the dies and abortion takes place. If then progesterone be administered, placenta formation continues and pregnancy proceeds up to full term. Inhibits uterine muscle progesterone desensitizes the uterine muscle to the action of oxytocin. (c) Development of breast: breast development during child birth due to proliferation of the glandular elements. (d) Inhibits estrogen or menstrual cycle and ovulation: During the pregnancy, maturation of follicles ovulation or menstrual cycle is inhibits also, the pituitary luteinizing hormone is inhibits by large doses of progesterone. (e) Enlargement of birth cannal: At full term birth cannal enlarge due to growth vagina and relaxation of pelvic ligaments. (f) Relation with estrogen: It help complete and antagonizes estrogens action. (g) Protein catabolic activity. (h) Water and slot metabolism Progesterone stimulated respiration and this is confirmed by the fact that in women during the leuteal phase of menstrual cycle, the alveolar PCO<sub>2</sub> is lower than male. **Hormonal assay:** Basal level of PRL,



LH, FSH, estrogen and progesterone measured by Chemiluminescence immunoassay (CLIA). **Specimen collection and preparation:** Following an overnight fasting venous blood sample were taken via a disposable plastic syringe inserted into an antecubital forearm vein. Blood (3ml) was allotted to clot for one hour in a plain test tube (burocell) and then centrifuged (REMI) at 30 ° Celsius for 5. **Prolactin hormone** minutes at 6000 rev min<sup>-1</sup> to separate the serum from the cell before proceeding with CLIA test. **Test procedure:** Reagent preparation: Wash buffer: dilute 20 ml wash buffer mixed with 1000ml distilled water and kept at room temperature (20-27 ° Celsius). **Working substrate solution:** The content of amber vial labeled solution “A” poured into the clear vial labeled solution “B” mixed and labeled accordingly stored at 2-8 ° Celsius. Test procedure: formatting the micro plate” wells for each serum reference add 13 µl of sample / stander into the wells. Add 50 µl biotin reagents. Mix the well properly for 60 seconds and incubation for 30 minutes at room temperature (22-26° Celsius). Wash 5 times by 350 µl of working wash buffer. Add 50 µl of tracer reagent. Mix the well properly for 60 seconds and incubation for 30 minutes at room temperature (22-26 ° Celsius). Wash 5 times 350 µl of working wash buffer. Add 50µl working single reagent and incubation for 5 times at room temperature. Recording of result: the micro plates were passed under the CLIA reader machine and recorded in ng/ml. **LH Hormone test procedure:** Reagent preparation Wash buffer: dilute 20 ml wash buffer mixed with 1000ml distilled water and kept at room temperature (20-27 ° Celsius). Working substrate solution: the content of amber vial labeled solution “A” poured into the clear vial labeled solution “B” mixed and labeled accordingly stored 2-8 ° Celsius). Test procedures: formatting the micro plates” wells for each serum reference add 25 µl stander / sample into the wells. Add 50 µl of tracer Reagent. Mix the well properly for 20- 30 seconds and incubation for 45 minutes at room temperature (22- 26 ° Celsius). Manually Wash the micro wells by prepare wash buffer for 5 times with 350µl of wash buffer and dry with tissue paper. After that 0.100ml substrate solution was add 50µl of signal Reagent to all wells. Incubation 5 minutes room temperature. Recording of result: the micro plates were passed under the CLIA reader machine and recorded in ng /ml. **FSH Hormone test procedure:** Wash buffer: dilute 20 ml wash buffer mixed with 1000ml distilled water and kept at room temperature (20-27° Celsius). Working solution LH the content of amber vial labeled solution “A” poured into the clear vial labeled solution “B” mixed and labeled accordingly stored 2-8 ° Celsius) test procedure: formatting the micro plate” wells for each serum reference 0.05ml specimen serum was taken by the pipette and given into the assigned wells. Add 25µl stander/sample in to the well. Add 50µl of tracer reagent. Mix the well properly for 20 – 30 seconds and incubation for 45 minutes at room temperature (22- 26 ° Celsius). Wash 5 times with 350µl of wash buffer. Add 50µl of signal reagent. Incubation for 5 minutes room temperature. Recording of result: the micro plates were passed under the CLIA reader machine and recorded in ng/ml. **Estrodiol Hormone test procedure:** Wash buffer: dilute 20 ml wash buffer mixed with 1000ml distilled water and kept at



room temperature (20-27 ° Celsius). Working solution the content of amber vial labeled solution “A” poured into the clear vial labeled solution “B” mixed and labeled accordingly stored 2-8 ° Celsius) test procedure :formatting the micro plate” wells for each serum reference add 13 ul of stander/sample in to the wells. Add 25µl of biotin reagent. Mix well it proper for 1 minute and incubation for 30 minutes at room temperature (22-26 ° Celsius). Add 25µl tracer reagent add directly on top of the reagent dispensed in the well, Mix swirl the plate for 1 minutes and incubation for 60 minutes at room temperature. Wash 5 times by 350µl of working wash buffer. Add 50µl working signal reagent and incubation for 5 minutes at room temperature. Recording of result: the micro plates were passed under the CLIA reader machine and recorded in ng/ml.

**Progesterone Hormone test procedure:** Wash buffer: dilute 20 ml wash buffer mixed with 1000ml distilled water and kept at room temperature (20-27 ° Celsius). Working solution the content of amber vial labeled solution “A” poured into the clear vial labeled solution “B” mixed and labeled accordingly store at 2-8 ° Celsius test procedure :formatting the micro plate” wells for each serum reference add 13 µl of stander / sample in to the wells. Add 25 ul of tracer reagent. Mix the well properly 1 minute. Add 25 µl of biotin reagent. Mix the well properly for 1 minutes. Incubation for 60 minutes at room temperature (22- 26 ° Celsius) washes 5 times by 350 of wash buffer. Add 50 µl of working signal reagent and incubation for 5 minutes at room temperature. Recording of result: the micro plates were passed under the CLIA reader machine and recorded in ng /ml test.

**Common Hormonal problem in female:** Infertility, irregular menstrual cycle, decreases in sex drive, unable to breast feeding after child birth. **Conclusion:** It may be concluded that exercise may change the level of secretion of various female hormones and if it is necessary to control the secretion of female hormone we may use exercise as an important tool.



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