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Effect of Practice Exercise on Health of Femininity Hormones and Fertility in Girls

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Abstract: The study aimed to claim the impact of exercise on the health of femininity and fertility in girls through the effect of exercise on the reproductive hormones (testosterone and estrogen) and trophic hormones (follicle stimulating hormone (FSH), luteinizing hormone (LH) and prolactin (PRL)) in girls of Faculty of Physical Education at Mansoura University. Twenty eight female students (aged 18-20 years) were randomized chosen from Faculty of Physical Education and Faculty of Nursing at Mansoura University, Egypt.They were divided into 2 groups: study group (14 students) and control group (14 students). The study group practiced only the physical exercises in the faculty curriculum for 3 months, 4days/week. The control group did not practice any kind of sport. There was no significant statistical difference between the study group and the control group regarding anthropometric measurements. There was a significant increase in testosterone level in the control group. Also there was a significant increase in estrogen level in the study group. Regarding FSH; LH and prolactin, there was no significant statistical difference in hormonal level in the study and control groups. It was concluded that vigorous exercise in young girls is beneficial in decreasing testosterone level and increasing estrogen level, with no effect on trophic hormones (LH, prolactin and FSH).

Key words: Exercise % Reproductive hormones % Trophic hormones % Girls

INTRODUCTION

For many years resistive exercises for women were shunned for fear of these athletes becoming masculinized through the use of heavy weights. However, early studies showed that women were able to exhibit considerable improvements in strength with only minimal degrees of muscle hypertrophy [1, 2].

It is generally accepted that exercise is beneficial for young women, since it increases cardiovascular fitness and reduces adiposity. Too much exercise can have negative effects on the reproductive and skeletal s ystems including primary and secondary amenorrhea thought to be caused by several factors including low body weight and improper nutrition. Primary and secondary amenorrhea present similar patterns of luteinizing hormone and follicle stimulating hormone suppression, probably involving the hypothalamic-pituitary-gonadal axis and possibly also the hypothalamic-pituitary- adrenal axis [3].

The female athletic triad consists of three interrelated problems: eating disorders, amenorrhea and osteopenia. The most serious aspect of hypoestrogenism is its effect on bone growth of athletes; those with delayed menarche show a higher incidence of scoliosis, stress fractures and osteopenia than do girls with normal menarche [4, 5].

Blood levels of hormones depend on a balance between production, metabolism and clearance rates. Intensive physical exercise may affect this balance via different mechanisms, such as stress associated with competition, dieting, reduction of body fat and body weight, production of heat and hypoxia [6].

Women who engage in regular high intensity exercise may be at risk, as a consequence of these hormonal changes, of developing menstrual disturbances such as oligomenorrhoea, delayed menarche and amenorrhoea. Impaired production of gonadotrophins, which leads to luteal phase deficiency and anovulation, is a common hormonal finding with exercise-induced menstrual disturbances, but several other hormones may show significant alterations [7].

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The research aimed to study the effect of exercise practiced by the female students of the Faculty of Physical Education at Mansoura University on reproductive hormones (estrogen and testosterone) and trophic hormones luteinizing hormone (LH), prolactin (PRL)) and follicle stimulating hormone (FSH).

MATERIALS AND METHODS

This study was conducted in Clinical Pathology Departments, Faculty of Medicine and Faculty of Physical Education, Mansoura University, Egypt from February 2008 until May 2008. It was a cross-sectional study, to study the effect of exercise practiced by the students of the Faculty of Physical Education on the reproductive hormones (testosterone and estrogen) and trophic Hormones (follicle stimulating hormone (FSH), luteinizing hormone (LH) and prolactin (PRL)).

The female students (aged 18-20 years) in the study were randomly chosen from Faculty of Physical Education, Mansoura University. The students included in the study were in a good physical and mental health. Twenty-eight students were included, divided into 2 groups: study group (14 female students) from Faculty of Physical Education, second class and control group (14 female students) from Faculty of Nursing, second class. The Study group practiced only the physical exercises in the faculty practical and academic program (Appendix 1) for 3 months, 4days/week. The daily practical physical exercise was ranging from 120-140 minutes (real exercise) after excluding periods of rest between lectures. The control group did not practice any kind of sports. Written consent was taken from every student.

Appendix 1: Practical and academic program performed by study group during research application

No	Course	No of Hours Practical
1.	Methods of Teaching Physical Education (Theories – Application)	2
2.	Basic Principles of Exercises	2
3.	Basic Principles of Swimming	2
4.	Basic Principles of Team Games (Soccer – Hokey)	2
5.	Basic Principles of Team Games (Hand – Small and Racket)	2

Hormonal Assay: All students in the study were fasting for at least 4 hours before taking the blood sample for hormonal assay. On day 3 of a spontaneous cycle, venous blood sample was drawn from each student, sample were allowed to clot in room temperature for at least 1 hour. All samples were centrifuged within 2 hours after withdrawal and stored at -20°C until assayed. Clear non hemolyzed sera were separated and used for assay of FSH, LH and Prolactin by solid phase two site chemiluminescent immunometric assay and testosterone and estrogen assay by solid phase competitive chemiluminescent enzyme immunoassay using Immulite analyzer supplied by DPC (USA).

Statistical Analysis: In this study we analyzed the results by using SPSS program. Mean, standard deviation (SD) and frequency were used to describe data. Student test was used to test for significance of difference in age, height and weight between students in both groups. Chi square and relative risks (RR) were used to test for significant difference in hormone level in both groups.

RESULTS AND DISCUSSION

There was no significant statistical difference between the study and control groups regarding anthropometric measurements as regarding age, height and body mass index (BMI) (Table 1).

There was significant statistical difference in estrogen level with significant increase in the control group. Also there was significant statistical difference in testosterone level with significant increase in the study group (Table 2).

Regarding trophic hormones (LH, prolactin and FSH), there was no significant statistical difference in hormonal level between study and control groups (Table 3).

Strength training, to enhance sports performance and improve fitness, is now a common means of exercise for women. It has progressed to the point that there is now a world championship in weightlifting for women [1].

In this study we found that there was significant decrease in testosterone level in women undergoing regular physical exercise. Also we found that the estrogen level was increased with exercise (Table 2).

Many studies focused on the role of testosterone in response to an exercise stimulus, especially resistive loading. It soon became apparent that, in addition to different basal levels between women, the response to exercise is quite different. The disposition of testosterone in the body differs between women only about 10 percent is bound to receptors in muscle in women (unlike males, about 50 % of the testosterone is bound to receptors in

Table 1: Anthropometric measurements in the study group (14 cases) and control (14 cases) group

	Study group		Control group				
	Mean	SD	Mean	SD	TTest	Pvalue	Significance
Age (Years)	18.07	1.07	18.93	1.25	1.98	0.058	Not significant
Height (Cm)	166.2	6.48	164.9	4.96	0.62	0. 58	Not significant
Weight (Kg)	64.57	5,98	68.78	7,42	1.85	0.11	Not significant
BMI (Kg/m^2)	21.5	2.7	22.3	3.2	1.13	0.08	Not significant

BMI: Body Mass Index

Table 2: Reproductive hormones among study group and control group

	Study group		Control group				
	Mean	SD	Mean	SD	Ttest	Pvalue	Significance
Estrogen (pg/ml)	111.45	98.53	45.85	21.18	2.43	0.02	Significant
Testosterone (ng/ml)	0.25	0.108	0.66	0.186	7.05	0.00	Significant

Table 3: Trophic hormones among study group and control group

	Study group		Control group				
	Mean	SD	Mean	SD	Ttest	Pvalue	Significance
LH (mIu/ml)	5.05	2.88	4.92	1.61	0.15	0.87	Not significant
Prolactin (ng/ml)	8.93	2.83	9.64	2.65	0.68	0.50	Not significant
FSH (mIu/ml)	5.45	1.22	6.25	1.63	1.46	0.15	Not significant

muscle). Our study results were in agreement with the study done by Puder *et al.* [8] who found that there was a negative correlation between the serum estrogen (E2) concentrations and the trunk-to-extremity fat ratio (r = -0.4), independent of age, exercise, body fat and serum testosterone (T) concentrations.

Jennifer *et al.* [9] noticed that there were no age-related differences in intensity measures during exercise. Absolute change from baseline in testosterone, estrogen and growth hormone was significantly greater in the exercise group compared with that in the control group. Results indicate that an acute bout of exercise can increase concentrations of anabolic hormones in females across a wide age range.

Kathryn *et al.* [10] reported that, physical activity level was inversely associated with estrogen in the late transition stage. Adjusted means for estrogen were 24.6 and 37.9, a relative difference of 54% in estrogen when comparing highest to lowest activity (P = 0.02). Similarly, there was an inverse association between physical activity and testosterone levels (means of 11.1 and 15.94 in the highest and lowest activity, a 47% relative difference; P = 0.01) (10).

In the present study we found that there was no significant statistical difference in trophic hormones (LH, prolactin and FSH) among study and control groups.

Shelley *et al.* [11] reported that prolactin concentrations were similar at baseline. Overall, the intervention was not associated with changes in prolactin concentrations between exercisers and controls at 3 months or 12 months. The intervention effect did not vary by baseline age, body mass index, parity, or change in percent body fat during the intervention. Although the exercise intervention had little effect on prolactin concentrations overall, increasing physical fitness was associated with reduced prolactin concentrations among postmenopausal women.

Too much exercise can have negative effects on the reproductive system, including primary and secondary amenorrhea probably through luteinizing hormone (LH) and follicle stimulating hormone (FSH) suppression by involving the hypothalamo-pituitary-gonadal axis[3,7].

CONCLUSION

Exercise causes some changes in the reproductive hormone levels in females with significant increase in estrogen level and significant decrease in testosterone level with no significant change in LH, prolactin and FSH hormone levels. we recommend vigorous exercise is in young girls as it is beneficial in decreasing testosterone level and increasing estrogen level, with no effect on trophic hormones (LH, prolactin and FSH).

REFERENCES

1. Zanker, C.L. and I.L. Swaine, 1998. The relationship between bone turnover, oestrogen and energy balance in women distance runners. British Journal of Sports Medicine, 32: 167– 171.
2. Warren, M.P., 1992. Amenorrhea in endurance runners. J. Clin. Endocrinol. Metabolism, 75: 1393– 1397.
3. Constantini, N.W. and M.P. Warren, 1995. Menstrual dysfunction in swimmers: a distinct entity. J. Clin. Endocrinol. Metabolism, 80: 2740– 2744.
4. Bjornerem, A., B. Straume and M. Midtby, 2004. Endogenous sex hormones in relation to age, sex, lifestyle factors and chronic diseases in a general population: the Tromso Study. J. Clin. Endocrinol. Metab, 89: 6039–6047.
5. Loucks, A.B., J.F. Mortola, L. Girton and S.S. Yen, 1989. Alterations in the hypothalamic-pituitary-ovarian and the hypothalamic-pituitary-adrenal axes in athletic women. J. Clin. Endocrinol. Metab., 68: 402.
6. McTiernan, A., S.S. Tworoger and K.R. Rajan, 2004. Effect of exercise on serum androgens in postmenopausal women: a 12-month randomized clinical trial. Cancer Epidemiol Biomarkers Prev., 13: 1099–105.
7. Vislocky, L.M., P.C. Gaine, M.A. Pikosky, W.F. Martin and N.R. Rodriguez, 2008. Gender impacts the post-exercise substrate and endocrine response in trained runners. J. Intl. Society of Sports Nutrition, 5: 7.
8. Puder, J., S. Monaco, S. Sen Gupta, J. Wang, M. Ferin and M. Warren, 2003. Estrogen and exercise may be related to body fat distribution and leptin in young women. Fertility and Sterility, 86: 694 – 699.
9. Copelanda, J.L., L.A. Consittb and M.S. Tremblaya, 2002. Hormonal Responses to Endurance and Resistance Exercise in Females Aged 19–69 Years. Biol. Sci. Medical Sci., 57: 158-165.
10. Schmitz, K.H., H. Lin, M.D. Sammel, C.R. Gracia, D.B. Nelson, S. Kapoor, T.L. DeBlasis and W. Ellen, 2007. Association of Physical Activity with Reproductive Hormones: The Penn Ovarian Aging Study. Cancer Epidemiology Biomarkers and Prevention, 16: 2042-2047.
11. Tworoger, S.S., B. Sorensen, J. Chubak, M. Irwin, F.Z. Stanczyk, C.M. Ulrich, J. Potter and A. McTiernan, 2007. Effect of a 12-Month Randomized Clinical Trial of Exercise on Serum Prolactin Concentrations in Postmenopausal Women. Cancer Epidemiology Biomarkers and Prevention, 16: 895-899.