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Hormonal Changes of the Girls as a Result of Practicing Athiletic Exercises

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Abstract: The purpose of this study was to create a proposed program of exercises and to examine its effect on certain hormones such as: Progesterone hormone (P), Estrogen hormone (E2), Lu einizing hormone (LH), Follicle Stimulation Hormone (FSH) and Prolactin Hormone (PRL). The study has been conducted on a sample of 12 junior females of the First Year, Faculty of Physical Education, which is divided into two groups, experimental group of 6 students (mean age= 17.48 ± 0.46 years, height = 163.6 ± 3.3 cm and weight =59.6 ± 5.8 kg). The proposed program has been applied on them, which contained 42 training units carried out during 14 weeks, 3 training units per week, with time ranging within 70 minutes. The control group was 6 students (mean age= 17.78 ± 0.74, length = 164.16 ± 5.6 cm and weight = 56.16 ± 5.84 kg). Experimental approach was used of a pre and post measures on both experimental and control groups. There are statistically significant differences in some hormones in the two study groups, the pre and post measures for the post- measure. The results of the experimental group were better. The proposed training program has a positive effect on some hormones of the sample of the study.

Key words: Girls · Hormones · Athletic exercise

INTRODUCTION

Practicing the athletic activity is an enriched field to develop the human being abilities and to protect him from diseases. Continuously practicing it for a long period leads to increase the efficiency of heart muscle, cardiovascular system and lungs in addition to blood that are known as physiological adaptation [1-3]. Furthermore, the identification of the physiological mechanical responses of the body and getting acquainted with the chemical laws, which functional changes are taken place on base of some factors that sustain the improvement of the body responses and control them in order to achieve the effectiveness of improvement. Maybe, the observably tremendous progress in the high-level results is only a direct yield of the scientific progress in various sciences [4].

Physiological changes are numerous and plentiful, especially those which associated with circulatory respiratory system, Genital system and the variables related to the nervous and osseous systems and the symptoms that accompany the women throughout their lives, in addition to the activity of hormones [5-6]. Estrogen is a general name called to the main hormones of female gender, which the two ovaries produce during women's life, but in small amounts except during the stage of fertilizing for the pregnancy, that is, from the age of puberty to the age of menopause (the end of the fertile phase) [6].

Estrogen Hormone (E2) is one of the most important femininity hormones, which is excreted from the ovum, yellow body, placenta and cortex of the suprarenal gland that sits on the top of the kidney. It is responsible for the other estrogens that concerned with the growth of female genital organ,organizing the menstrual cycle and femininity characteristics. It also plays a role in metabolism, the energy production and pulmonary ventilation. Any defects in the excretion of the hormone lead to the disappearance of the femininity features and disorders in a menstrual cycle, retardation of procreation and possibly infertility [7].

Progesterone Hormone (P) is the pregnancy hormone or the yellow body, which excreted from the yellow body, placenta and cortex of suprarenal gland that sits on the

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top of the kidney; while produced in a small quantity from the ovum. Its maximum concentration is achieved at the beginning of menstruation and if the fertility occurs, pregnancy will continue. Its existence also helps to preserve the pregnancy. While the lack of this hormone will lead to incapacity to procreation, its scantiness leads to abortion [8].

An increase in the concentration of the Estrogen and Progesterone hormones is occurred in the blood plasma pursuant to practicing athletic exercises, whether aerobic or anaerobic. The proportion of improving progesterone is higher than Estrogen. The proportion of concentration of the two hormones has been estimated by 50% after the application of the program of physical exercises. The best percentage of improvement is in the excretory and reproductive phase while destructive phase is less than them [9-10].

The hormones, which stimulate the sexual gland, help femininity hormones to practice the functions of sex. They are produced from the anterior lobe of the pituitary gland which divided into three types, 1) Follicle Stimulation Hormone (FSH), 2) Lu teinizing Hormone (LH) and 3) Prolactin Hormone (PRL).

The hormone (FSH) is important in creating ova in the ovary. It also increases the growth of cells surrounding the ovum, which provides it with food required for its growth in preparation for the excretion of Estrogen hormone and any defect in the excretion of (FSH) hormone will lead to a lack of sexual maturity in the female. The (LH) hormone, which secreted from the anterior lobe of the pituitary gland, helps to increase the efficiency of ovulation and any defect in the excretion will lead to an irregularity of the ovulation. Its impact is obvious in the excretion of progesterone, where the (FSH) with (LH) hormone alert the production of the Estrogen as well as progesterone hormone in the ovary [7].

The athletic program is not only enough to make a variation in the percentage of(FS), (LH) hormones, while the continued athletic exercise makes a little improvement in their percentages.The effect of Estrogen on the function of muscle subjected to exercise is unknown. Some studies put positive results, while others emphasize that there is no effect [11-12]. The prolactin (PRL) hormone is the hormone of the production of prolactin and excreted by the over-kidney adrenal cortex and the frontal lobe of the pituitary gland. It also works to the synthesis of progesterone during pregnancy and prevents the creation of Estrogen and testosterone, leading to low in sexual desire after child birthing, which called sexual chemistry and also help the growth of the prolactin gland [8].

The (PRL), which is excreted during athletic exercises, is important and useful to keep the water rate in the body through the production of urine in the kidneys in addition, to move the fat utilizing it for producing energy. It also affects the excretory activity of the yellow body so it affects the excretion of the progesterone hormone (P) and any disorder in the excretion of the hormone will lead to menopause and disorders in a menstrual cycle and thus the lack of fertility. High intensity training increases the proportion of (PRL) hormone as the daily violent training excessively increases prolactin causing Dysmenorrhea. Furthermore, practicing violent sports lead to some disorders in the menstrual cycle upon the female due to increase in stress tension hormones such as Adrenaline and Adrenaline Light [11, 13]. Because of the scarcity of scientific research related to this field, the results of this study may contribute in clarifying if there is an effect for proposed and frugal athletic program on some hormones. Therefore, it will be a helpful guide in putting the program of physical preparation for female athletes to suit with results. Thus, the aim of the present study is to put a program of physical exercises and examine their effects on the hormones of some girls.

MATERIALS AND METHODS

Pre and post measures are applied to both experimental and control groups. The proposed program has included 42 training units that contain warm-up exercises, exercises for general physical preparation and exercises for calm-down and relaxation. The content of the program is performed in the form of progressive training units; each unit comprises of eight exercises performed in the form of phases (sequencing exercises). Training units are carried out at a rate of three times per week. The average of actual performance for each exercise is 6 minutes. The time of training unit is 70 minutes divided into 5-minute warm up, 60-minute exercises, 5-minute calm-down and a conclusion. Interval average between each exercise is 45 seconds when the average number of heart pulsates is 110-130 pulsates/second.

Participants: 12-female-student volunteers were intentionally selected from the first year students of the Faculty of Physical Education, Port Said University. They have divided into two groups, an experimental group of 6 female students (mean age= 17.48 ± 0.46 years, 163.6 ± 3.3 cm height and 59.6 ± 5.8 kg weight). The control group consisted also of 6 female students (mean age= 17.78 ± 0.74, 164.16 ± 5.6 cm height and 56.16 ± 5.84 kg weight). There are no significances of differences between the two groups of the study at

Table 1: The significance of differences between both experimental and control groups of the study in the pre- measures of length and weight using non-parametric Mann–Whitney N1= N2= 6

Measures	Groups	Mean of ranks	U	Significance
Age	Experimental	16.27	13.5	Non-significant
	Control	14.73		
Length	Experimental	5.75	13.5	Non-significant
	Control	7.25		
Weight	Experimental	6.0	18.0	Non-significant
	Control	6.5		

Tabular *Y* at the level of significance of 0.05=8

Table 2: The significances of differences between both experimental and control groups of the study in the pre-measures of length for some hormones using non-parametric Mann–Whitney N1= N2= 6

Measures	Groups	Mean of ranks	U	Significance
Progesterone (P)	Experimental	6.75	16.5	Non-significant
	Control	6.25		
Estrogen (E2)	Experimental	6.91	15.5	Non-significant
	Control	6.08		
Lutinizing (LH)	Experimental	6.41	17.5	Non-significant
	Control	6.58		
Follicle (FSH)	Experimental	6.17	16	Non-significant
	Control	6.83		
Prolactin (PRL)	Experimental	7	15	Non-significant
	Control	6		

Tabular *Y* at the level of significance of 0.05=8

the 0.05 level of significance in pre-measures, which indicate the equivalence between the two groups of the study in these variables (Table 1).

No differences in significance are between the two groups of the study at the level of significance of 0.05 in pre- measures for some hormones, which indicate the equivalence between the two groups of the study in these variables (Table 2).

Measures The physical measurements used were length and weight. The femininity hormones were Progesterone Hormone (P), Estrogen Hormone (E2), Lutinizing Hormone (LH), Follicle Stimulation Hormone (FSH) and Prolactin Hormone (PRL).

Procedure Pre-measures Physical measures of height and weight were carried out. The blood sample was pulled, of a female student or two each day, to measure the hormones for the 10-day period. This disparity in the day is due to the disparity in the days of menstruation for both (from the eighth day to the fourteenth day of the end of the menstrual cycle). To try to install the second phase, in which the blood was pulled from each of them, the concentration of hormones was determined, which was varied according to the stages of the menstrual cycle in addition to adding particular materials to detect the concentration of hormones in the blood. *Post-measures* They are the same pre-measures and the same equipments under the same conditions for both groups.

Statistical Analysis: All data were analyzed using the Statistical Package for Social Sciences (version 10.0; SPSS Inc, Chicago, IL) for Microsoft Windows (mean, standard deviation, coefficient of Skew, non-parametric Mann-Whitney calculate the significance of differences and Wilcoxon Test to calculate the significance of differences between pre and post measures).

RESULTS AND DISCUSSION

There are statistically significant differences at the level of significance 0.05 for the pre-measure in (P), (LH), (FSH) and (PRL) hormones while there are no statistically significant differences in (E2H) hormone (Table 3).

There are statistically significant differences between pre-measure and post-measure of the Control group for post-measure in some hormones of (P), (LH), (FSH) and (PRL) hormones while there are no statistically significant differences in (L-H) and(E2) hormones (Table 4).

Table 3: WilcoxonTest of the significance of differences between pre and post-measures for the experimental group, N=6

			Difference			
Statistical treatments of variables	Measure	Mean of ranks	Direction	No.	Value of Z	Statistical significance
Progesterone (P)	Pre	1.0	-	1	1.0	Significant
	Post	4.0	+	5		
			=	-		
Estrogen (E2)	Pre	1.5	-	2	3.0	Non-significant
	Post	4.5	+	4		
			=	-		
Lutinizing (LH)	Pre	1.5	-	1	1.5	Significant
	Post	3.9	+	5		
			=	-		
Follicle (FSH)	Pre	0.0	-	-	0.0	Significant
	Post	3.5	+	6		
			=	-		
Prolactin (PRL)	Pre	0.0	-	-	0.0	Significant
	Post	3.5	+	6		
			=	-		

The value of tabular Z = 2 at the level of significance 0.05

Table 4:Wilcoxon Test of the significance of differences between pre and post-measures for the control group, N = 6

			Difference			
Statistical treatments of variables	Measure	Mean of ranks	Direction	No.	Value of Z	Statistical significance
Progesterone (P)	Pre	2	-	1	1	Significant
	Post	3.8	+	5		
			=	-		
Estrogen (E2)	Pre	3	-	2	3	Non-significant
	Post	3.75	+	4		
			=	-		
Lutinizing (LH)	Pre	4	-	1	1.5	Significant
	Post	3.4	+	5		
			=	-		
Follicle (FSH)	Pre	2	-	1	0	Significant
	Post	3.8	+	5		
			=	-		
Prolactin (PRL)	Pre	0	-	-	0	Significant
	Post	3	+	5		
			=	1		

The value of tabular (Z) = 2 at the level of significance 0.05

Table 5: The significances of differences between both experimental and control groups of the study in the post-measures using non-parametric Mann–Whitney N1= N2= 6

Measures	Groups	Mean of ranks	U	Significance
Progesterone (P)	Experimental	6.4	17.5	Non-significant
	Control	6.6		
Estrogen (E2)	Experimental	7.8	10.0	Non-significant
	Control	5.2		
Lutinizing (LH)	Experimental	7.1	14.5	Non-significant
	Control	5.9		
Follicle (FSH)	Experimental	7.1	14.5	Non-significant
	Control	5.9		
Prolactin (PRL)	Experimental	8.4	6.5	Significant
	Control	4.6		

There are statistically significant differences at the level of significance 0.05 for the post-measure in (P) hormone. Such results were reported [9-11].

There is also a significant difference in favor of post-measure in (PRL) hormone (Table 5).

DISCUSSION

The first hypothesis was that there would be statistically significant differences in the pre- and post-measures of the experimental group in favor of the post-measure in some hormones. There were also statistically significant differences for post-measure in (LH); (FSH) hormones while there were no statistically significant difference in (E2) hormone, which was consistent with the study conducted by McCracken *et al.* [14]. Although there were statistically significant differences in the other hormones, (E2) had no significance where increasing in the prolactin hormone (PRL) after practicing athletic exercise led to lack of Estrogen (E2), while the (PRL) prevents the transformation of Androgen to Estrogen in the ovarian. Any disorders in one of these hormones did not make the others have the ability to carry out the tasks properly. In particular, (E2) is responsible for procreation in the female and other hormones help it carry out this task. Hormonal discipline is meant here, not an excessive increase, that is, any disorders even if an increase leads to damages. The severity of the weight should be verified as previously mentioned by McCracken *et al.* [14].

In addition to preventing any negative effects on (PRL) hormone for example that clearly leads to dymenorrhea or infertility. This was confirmed by the study of Keizer [11]; although its benefits are many in Pulmonary ventilation and energy production - and although there are statistically significant in (FSH) hormone, (LH) hormone, two of them are responsible for alerting the production of the (E2) (P) hormone. The effect only appears clearly on the (P) hormone rather than the hormone (E2). This assures what previously mentioned here the hormonal discipline is not an excessive increase, which may lead to an inverse image, especially that hormones called delicate balance. Therefore, the first hypothesis was supported where there were statistically significant differences in some hormones, such as (P) (FSH) (LH) (PRL), while there were no statistically significant differences in (E2) hormone.

The second hypothesis was that there would be statistically significant differences in the pre- and post-measures of the control group in favor of post-measure in some hormones.

For the Control group, there were statistically significant differences at the level 0.05 in favor of the post-measure in (P) hormone (Table 4). A study conducted by John [15] who pointed out that practicing sport affected (P) hormone. There were also statistically significant differences in (PRL), (FSH) hormones in favor of the post-measure. Since the sample here is practicing the athletic exercises (female Students of the First Year)and the program was not applied on them. So, this hormonal change is due to practice the athletic exercise represented in the practical approach. There are also no statistically significant differences in(LH),(E2) hormones.The findings of McCracken *et al.* [14] were the absence of clear differences in these hormones, thus the second hypothesis is supported where there were no statistically significant differences in (LH), (E2), while there were statistically significant differences in (P), (FSH), (PRK) hormones.

The third hypothesis was that there would be statistically significant differences in the post-measures of both experimental and control group in favor of post-measure of the experimental group in some hormones.

There were statistically significant differences between in the post-measures of both experimental and control groups in the (PRL) hormone for the experimental group (Table 5). This was confirmed and consistent with the study of Keizer [11]who reported that an increase in practicing the physical activity leads to a higher excretion of (PRL) hormone. There were no statistically significant differences in (P) (E2) (LH) (FSH) hormone. This is consistent with what was shown by Keizer [11] as well as the study of John [15] who reported that there were no statistically significant differences between the two groups after performing the program, despite the improvement shown in each of those variables (E2) (P) (LH) (FSH). Therefore, the third hypothesis was supported.

CONCLUSION

The proposed training program has a positive effect on some hormones of the study sample. Practicing physical exercise affects with varying proportions on the activity of some hormones.

Recommendation: Different standardized training programs suitable for female players should be developed. Periodical medical examinations and physiological tests should be performed on the female players to identify the concentration of hormones to address any

deficiencies that may arise. Further similar studies and researches should be done on men and on various sports activities to make sure that the program has no negative effects.

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