

Hormonal imbalance of Marathon female runner's

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Abstract: Marathon event is an intensive aerobic training in female athletes that may affect reproduction through hypothalamic – pituitary – gonadal axis function. The Purpose of the study is to investigate hormonal imbalance of Marathon female runners. Hypothesis: there are statistical differences in hormonal profile between marathon female runners and regular female athletes. Methods: the researcher used the descriptive methods of two groups, 10 participants each, one marathon female runners, the other regular female athletes. Hormonal profiles were determined [FSH, LH, 17 Bestradiol and prolactin] using Kits and Eliza technique, pulse rate, Blood pressure and respiratory rate were also evaluated at rest. Homogeneity for basic characteristics, age, weight, height and practice duration. Results indicated a significant differences changes in hormonal profiles of marathon female runners and regular female athletes. Conclusion: It is concluded that intense aerobic training in marathon female runners may lead to disfunction of the menstruation and hormonal profile and cardio respiratory system.

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1. Introduction:

In females, the gonads have a dual functions:

The production of germ cells and the secretion of sex hormones. Estrogen is the hormone of feminizing, and the ovaries secrete large amount of estrogens and small amount of androgens, the ovaries also secrete progesterone, a steroid that has special functions in preparing the uterus for pregnancy. The secretory and gametogenic function of the gonads are both dependent upon the secretion of the anterior pituitary gonadotropins, FSH and LH. In females an orderly, sequential secretion of gonadotrophins is necessary for the occurrence of menstruation (Ganong, 2000). In some females puberty is delayed it is called primary amenorrhea. It appears that prolactin secreted by anterior pituitary may produce amenorrhea by blocking the action of gonadotropins during exercise and Psychologic stresses (Barrett et al, 2010).

Amenorrhea should not be regarded as benign. Any female athlete, who has been amenorrhoeic for six months should be assessed medically (Harries et al, 2005) (Carlos et al 2015).

Amenorrhea is the absence of menstrual periods. If menstrual bleeding has never occurred, the condition is called primary amenorrhea. Some women with primary amenorrhea have small breasts and other sign of failure to mature sexually Cessation of cycles in a woman with previously normal periods is called secondary amenorrhea. This might be caused by emotional stimuli, changes in environment hypothalamic, pituitary disorders or due to successive stressful conditions, physically. (Mattews and Gustafson, 2003, Mc langhlin and Donahoe 2004).

Training stresses in females might be one of the possible cause of amenorrhea, Harries et al (2005) reported many athletes are going faster than even before but think that training even harder is the only way to achieve even greater success, so they cut recovery time to permit more training competition. Others decided to cut their rest days to train seven days a week instead of five. Swimmers increased their training to eight hours a day for several months, the performance improved and then started to fail to recover from training and took months to recover from they were subjected to irregular menstruation. The Physical or psychological stresses may affect hormone profile leading to health disturbance specially in intense aerobic training for several months (El Kot, 1998).

The purpose of the study is to investigate the hormonal imbalance of marathon female runners compared to regular female athletes (control).

Research Hypothesis:

There are significant statistical differences in hormonal profile between marathon female runners and regular female athletes.

2. Methods:

Research method: The researcher used the descriptive method of two groups, one control and experimental group. The experimental group was composed of 10 female long distance runners (Marathoners, half Marathon), the control group was composed of 10 female athletes practicing regularly.

Table (1) Basic characteristics of control and experimental groups

Variables	Control		Experimental		T
	M	SD	M	SD	
Age (y)	21.3	4.6	20.9	5.6	1.59
Height (cm)	165.4	9.4	166.1	10.1	1.4
Weight (kg)	64.4	8.7	63.8	9.4	1.79
Practice duration (y)	5.4	1.7	5.8	1.9	1.9

P<0.05 Non significant changes between control and Experiment groups in basic characteristics indica homogeneity

Table (2) Hormones profile of the athletes female runners at rest

Hormones	Rest	
	M	SD
FSH (Mg/ml)	3.2	0.6
LH (Mg/ml)	2.1	0.5
17B estradiol (Pg/ml)	42	8.4
Prolactin (Mg/ml)	15.2	2.2

Table (3) Hormones profile of the control group at rest

Hormones	Rest	
	M	SD
FSH (Mg/ml)	5.1	0.8
LH (Mg/ml)	4.6	0.7
17B estradiol (Pg/ml)	65	6.3
Prolactin (Mg/ml)	8.2	7.8

Table (4) Hormonal profile of the control and experimental groups at rest

Variables	Control		Experimental		T
	M	SD	M	SD	
FSH (Mg/ml)	5.1	0.8	3.2	0.6	4.1
LH (Mg/ml)	4.6	0.7	2.1	0.5	4.6
17B estradiol (Pg/ml)	56	6.3	42	84	5.7
Prolactin (Mg/ml)	8.2	1.8	15.2	2.2	9.6

P<0.05 significant differences between control and experimental group in hormonal profile

Table (5): Statistical differences of some physiological changes in control and experimental groups

Variables	Control		Experimental	
	M	SD	M	SD
Pulse rate pulse/m.	72	6.4	78*	6.1
Blood pressure systol min/Hg diastole	120	8.6	125*	9.2
	80	7.4	84*	6.6
Respiratory rate rate /m.	12	4.3	18*	5.3

P<0.05 significant differences of some physiological changes in control and experimental groups

The long distance female runners who were training intensive aerobic training for several months complained of irregular menstruation, and sometime amenorrhea, diagnosed by specialist in gynecology, while the control group did not complain of any disturbance in menstruation and the circumstances indicating referral of amenorrhoeic athletes to specialists:

- Athletes with primary amenorrhea (that is aged 17 or older)
- Athletes in whom there is no clear cut association with training
- When amenorrhoea persists for more than six months.

Intensive training in child hood may possibly delay the onset of puberty. Some athletes may reach the age of 20 before menarche. This delay in menstrual function is associated with effects on skeletal maturation, with an increased in the risk of damage to epiphysis.

The study was determined by marathon female runner of El Ahly club.

Throughout the duration of 9/1/2015.

The basic characteristics of the control and the Marathoners were determined for age, weight and height and years of practicing.

The participants of control and experiment group were fasting in the morning for 8 hours for hormonal determination of: 17 Estradiol, FSH, LH, Prolactin hormones in venous blood, using special Kit for each hormone and Eliza technique the procedures were determined in special Lab. Clinilab in Cairo governorate together with hormonal detection some physiological test of pulse rate, Blood pressure and respiratory rate to express the cardio- Respiratory system.

Tools used in the study:

- Syringes, tubes cotton, spirit, plasters.
- Kits for hormones.
- Eliza equipment.
- Ice box.
- Refrigerator.
- Pulse meter.
- Stethoscope
- Restameter
- Weight scale

Statistical Analysis:

Using the statistic program SPSS for determination of

- arhythmic mean
- Standard deviation
- T test

3. Discussion

Hypothesis: There are significant statistical differences in hormonal profile between marathon female runners and regular female athletes

Intensive aerobic training in female athletes, children or even men may affect reproduction through. Hypothalamic pituitary – gonadal axis function. Some gymnasts and ballet dancers and long distance female runners may possible reach the age of 20 before menarche. This delay in menstrual function is associated with effects on skeletal maturation, with an increase in the risk of damage to epiphysis. The circumstances indicating referral of amenorrhoeic athletes to specialists, athletes with amenorrhoea that is aged 17 or older, athletes, in whom there is not clear cut association with training and when amenorrhea persists to more than six months (Harris et al, 2005) (Yen et al, 1999).

Table (2, 34) reveals the hormonal profile of the control and experimental group at rest in FSH, LH, 17B estradiol and prolactin. In case of gonadotrophic hormones, FSH, LH, there are a significant decreased concentration of both hormones for the favor of the control group. The decreased FSH, LH concentrations of the experimental group may be caused due to the hypersecretion of prolactin (Hyperprolactinemia) which suppress gonadotrophins secretion of the marathon female runners due to stress which occur from the intensive successive aerobic training for a long period of time. This long duration exercise induce the stresses leading to hyperprolactin secretion which in turn decreased gonadotrophins FSH, LH. And the long distance female runners may be subjected to delayed menstrual function or irregular menses or even amenorrhea (Ben, Jonathan and Hnaski, 2001) (Freeman et al, 2000).

As for 17B estradiol, Table (2,3,4) indicated a decreased concentration of the hormone in case of the female marathon runners compared to the control group. The possible cause of the decreased 17B estradiol may be due to increased prolactin and decreased gonadotrophins FSH, LH, leading to decreased 17 B estradiol and hence menstruation abnormalities. (Goffin et al, 2002), Khalaf.2003).

Gimpl (2001) added that 17B estradiol formation and biosynthesis come through cholesterol which is the precureser of the female hormone (Estrogen). It is noticed that the long distance female runners may develop decreased fat percent from the intensive aerobic training resulting to decreased fat % and decreased cholesterol synthesis which in turn affect 17B estradiol biosynthesis (Guyton & Hall, 2006).

Wilson et al (1994) stated that low estrogen concentration has several effect on reproduction and

on the skeleton, in particular a reduction in bone density despite high levels of exercise.

Amenorrhoeic athletes have a higher incidence of stress fractures than their eumenorrhoeic counterparts. Although this may be due to low estrogen, intensive training increases the risk of both stress fractures and amenorrhea. (Gruber et al, 2002) Lorenzo 2003).

Amenorrhea has negative action such as decrease calcium from bone, fracture opportunities more than normal also osteoporosis may be found and inability to be pregnant. Also the decrease weight 15% than normal may subject the women to amenorrhea also fear of obesity which are part of athletes feature (Jeff and Barbara, 2012) they added that for decreasing the occurring of amenorrhea the long distance female runner must decrease the distance of running 50% for several months and may substitute swimming in substitution of running also increase in weight 5 pound by increasing nutrition which may help menstruation, eating a lot supply of protein and calories and must, increasing lipids 20% and olive oil, salmon, Peanut, butter Nuts increase meat and calcium in food.

Bahaa salama (1999) and Hussein Heshmat and Mohamed Salah (2009) reported that the physical training increased the energy output of the subject to the need of the muscles for contraction and the hormones that help in energy output during physical training are stress hormones.

They added that Hormonal response are classified to:

1- Fast responses: ex. Catecholamines Hormones and cortisol at the beginning of physical effort.

2- Moderate responses: ex. Thyroxine, growth hormone and ADH throughout the physical effort

3- Delayed Responses: ex. Estrogens, testosterone aldosterone which are released later.

All the responses of hormone are in conjunction of the CNS in physical effort.

Table (5) indicated an increased pulse rate, blood distance female runners compared to control and the increase in these parameters may result from the action of the autonomic Nervous system (Sympathetic) due to continual stresses affecting the female long distance runners which secrete catecholamines, in turn affect both cardio – vascular and respiratory system leading to increase rates of all of them. (Baker et al, 2011, Bresciani et al, 2011, Crewther et al, 2013, Moreira et al, 2012)

The increased pulse rate, Blood pressure and respiratory rates are peculiar to amenorrhea.

The preceded discussion indicated that the research hypothesis has been realized.

Conclusion:

It may be concluded that:

Intensive aerobic training in long distance female runners can cause an imbalance in neuro secretory and reproductive hormone leading to disfunction of the menstruation and affecting cardio- vascular Respiratory system.

Recommendation:

It is recommended to rationing the training program on scientific basis, and managing athletic amenorrhea that any female athlete who has been amenorrhoeic for six months should be assessed medically.

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