



CLINICAL, BIOLOGICAL PRESENTATION OF SIX CASES OF FUNCTIONAL HYPOTHALAMIC AMENORRHEA

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ABSTRACT

The present study was conducted in order to exploit the association between eating disorders and irregular menstrual cycles that will, ultimately, bone density and expression of the female athlete triad. **Methods:** six international level footballers, with amenorrhea of three months or more. All participants were asked to record their answers on a standardized questionnaire about their ovarian cycle for the analysis of the disorders of menstrual cycle and food survey in a week to calculate the energy contributions by the BILNUT software. We have also conducted anthropometric measurement in order to measure the fat mass and the meager one. **Results:** Our results show that the BMI is low <math><18.5 \text{ kg / m}^2</math> with an important weight loss in 3 months. Our data show also that 83% of them worry about losing control of what they eat. While, the food survey shows, a food restriction translated by a negative energetic balance sheet (-79.7 Kcal / d). Furthermore, the participants have a high rate of cortisol accompanied by a remarkable decrease above of the normal levels of Oestradiol. **Conclusion:** Weight loss, with or without a low body mass index associated with a poor perception, her slimming and disorders of monthly cycles must evoke the diagnosis of eating disorder behavior.

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INTRODUCTION

Women are exclusively confined to domestic tasks only, gradually emancipated to conquer a space of historically reserved expression to man. Nowadays the woman is present in all higher-level competitions, and practice sports that for a long time were the exclusivity of men. The sport is no longer sexed. In the same way as her alter-ego, the woman has to respond to the same solicitations to qualify for the status of endurance sports, where performance is imposed as a criterion of appreciation and evaluation. The high-level sportswoman must conform to and comply with an order of rationality required by high-level sports practice. This order of rationality organizes the social life of the sportswoman and her food decisions. The choice of food is no longer a matter of personal whims, but it must meet the requirements of the discipline practiced and the concern for performance. Because of this, the importance that athletes place on their weight is sometimes disproportionate, see unhealthy. This sometimes leads to eating disorders which, when associated with amenorrhea (Absence of menstruation) and osteoporosis (bone fragility), is called the triad of the female athlete (Patrice Lefebvre & Bringer, 2005a).

Amenorrhea is one of the main reasons for consultation in reproduction. They are defined by the absence of a menstrual cycle in girls after the age of 16 years with or without pubertal development - primary amenorrhea (AP) - or by Interruption in a previously regulated woman - secondary amenorrhea (AS) (Young & Schaison, 2000). The prevalence of cyclical disorders varies according to the type of sport practiced; and Athletes, 30 to 79% in so-called aesthetic sports, 26 to 35% in endurance sports. In the general population, amenorrhea varies from 2 to 5% (Michelle P., 2008).

However, Food Behavior Disorder (FBD) is an insidious disease that induces metabolic imbalances that can sometimes lead to death. The type of FBD that affects sportswomen differs from other cases, these latter do not fall within the strict definition of mental anorexia, but rather a weight control exaggerates the young, caused vomiting this disease affects 1 to 2% of the general population versus 15 to 62% Of the female athletic population and especially athletes who practice sports that require thinness (Sundgot-Borgen, 1993) In this paper, we are particularly interested in puberty footballers, not postmenopausal. In a first part, we will study the biological semiology of the sportswoman with functional hypothalamic amenorrhea. In a second part, we will explore in detail its morphological, hormonal and nutritional profile,

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with a view of preventing a possible energy deficit. Finally, we will exploit the association between eating disorders and irregular menstrual cycles that will ultimately, bone density and expression of the female athlete's triad.

Patients and Methods

The study we have undertaken is a cross-sectional descriptive and retrospective extended over a period of a sports season on six international and national level footballers, nationality residing in the city of Constantine where they carry out their professional and sports activities with an average age of 23.83 ± 7.57 , with amenorrhea of three months or more. Characterized by (P. Lefebvre, Bringer, & Orsetti, 1997):

- Pulsatility alteration of LH (follicular phase);
- A decrease in LH and FSH;
- Hypo estrogenic;
- A decrease in progesterone.

The clinical diagnosis of AHF

All of our participants were requested to sign an informed written consent prior to participation in the study. By the following, they were subjected to clinical investigators by answering to a standardized questionnaire. This questionnaire is about: age, general health, the menstrual cycle for detecting the frequency of the cycle disorders (2014 Female Athlete Triad 2013 -- De Souza.). Followed by anthropometric measurements: Weight, size and measurement of skin folds by the Durnin and Womersley equation (Frederic, 2008). For the estimation of the percentage of fat mass and lean mass.

The food survey

At the end of the clinical examination, a food survey has been established over a week to calculate the energy contributions by the BILNUT software (BILNUT and composition table of food).

This survey included a questionnaire FDBDF (French definition of behavioral disorders Food) to detect FBD elements that consist of five questions Dichotomous of which, we assigned a score of 1 for each positive answer (yes) and 0 for the negative one (no) to calculate the score:

1. Do you make yourself vomit because you feel too much eating?
2. Do you worry about losing control of what you eat?
3. Have you recently lost more than 6 kg in 3 months?
4. Do you think you are fat while others think you are too thin?

5. Would you say that food dominates your life?
6. The FBD questionnaire was affordable for all of our participants and had filled in less than 2 minutes.

It must be noted that two positive responses will be strongly predictive of TCA.

Biological analysis

Approximately 15 mL sample of venous blood was obtained from the arm on heparin tubes between the 2nd and 5th day of menstruation. The blood samples have been centrifuged at 3000 rpm, the obtained sera used immediately at the end of realization: a Biochemical assay for: blood glucose, CPK, Triglycerides, cholesterol, HDL, LDL, cortisol, calcium, and iron. A Biological assay of sex hormones: LH, FSH, progesterone, estradiol, Prolactin, testosterone to explore ovarian function and eliminate intercurrent pathology. It is reported that the assays have been realized using the CI 8200 Architect Analyzer (Abbott Laboratories, Abbott Park, IL, USA) at the CHU Constantine Biochemistry Laboratory.

Statistical Analysis

Statistical analyses were carried out using the SPSS 20 program for windows. Descriptive statics and Pearson correlation coefficients were calculated. The confidence level for statistical significance was set at $p < 0.05$.

RESULTS

Table 1 shows the anthropometric characters, the percentage of fat mass of the index of body mass BMI, food control, training hours per week, balance sheet of the six sportswomen studied, two of which are full-time professional sports women and the other four are university and high school students who practice sports during schedules well adapted. Our results show that the BMI is low $< 18.5 \text{ kg / m}^2$ that corresponds to a stage of thinness with an important weight loss ($2.66 \pm 2.6 \text{ kg}$) in 3 months and a percentage of fat mass also Low equal to $15.5\% \pm 2.5$ (table 2).

Turning now to the FDBDF questionnaire, which was affordable for all of our participants, they were able to fill it in less than 2 minutes. Our results for this questionnaire reveal that the participants control all their daily feeding (three of which follow a well-balanced diet) and that none of the participants b causes vomiting if she feels overeating. Our data show that 83% of them worry of losing control of what they eat. However, in terms of weight, loss our data show that only 2 out of 6 athletes lose more than 6 kg in 3 months and two women consider that food dominates their lives and that

Table 1 Characteristics of six sports women studied

	Patiente1	Patiente2	Patiente3	Patiente 4	Patiente5	Patiente6
level of Competition	international	national	national	national	international	national
Age	21	19	33	18	34	18
BMI (kg/m ²)	19	17.7	18.96	16.53	17.97	18.4
Fat Energetic balance (%)	15.6	20.6	14.8	10	14	18
Bilan	-150.7	-140	-20	-164	-105	102
Dietary plan	yes	yes	No	yes	No	No
food control	yes	yes	yes	yes	yes	No
weight loss	-6	-3	0	-7	-0.5	0.5
protides (%)	7.83	8.9	16	6.1	5.9	13.28
Lipides (%)	11.35	10.65	21	10	22.3	25
carbohydrat (%)	80.8	80.45	63	62	71	73
Score FBD	2	1	0	4	1	1

they can no longer do without it. To the end of this questionnaire, we have calculated the scores and the results were as following: four sportswomen show a score of 2; two sportswomen have a Score of 2 which confirms the presence of the FBD. It is reported that the highest score in our sample was present in subject 4.

Table 2 anthropometric results

anthropometric results	Mean
BMI (kg/m ²)	17.93±0.7
% fat mass	15.5±2.56
weight loss (kg)	-3±2.66

Table 3 The answers of sportswomen about the FDBDF questionnaire

Questions	Positive response	Proportion
Do you make yourself vomit because you feel too much eating?	0	0%
Do you worry about losing control of what you eat?	5	83%
Have you recently lost more than 6 kg in 3 months?	2	33%
Do you think you are fat while others think you are too thin?	1	16%
Would you say that food dominates your life?	2	33%

The results of the food survey show a food restriction translated by a negative energetic balance sheet (-79.7 Kcal / d) which we have noticed that the food of these athletes was rich in carbohydrates (71.7%) and that lipid and protein inputs were not sufficient (16.71%).

Table 4 Results of the sports women food survey.

Parametrs	Sportives AHF
% protein	9.66
AET LIPID	16.71
carbohydrates	71.70
negative energetic balance sheet(Kcal/j)	-79.7

As for the food survey shows that food restriction is translated by a negative energetic balance sheet(-79.7 Kcal / d) in which we have noticed that the food of these athletes was rich in carbohydrates (71.7%) and that lipid and protein inputs were not sufficient (16.71%).

Table 5 the biological balance sheet represented by the dosage of cortisol, CPK, Glycemia and Oestradiol.

Parameters	Mean	Normes
Cortisol (µg/dl)	33,98	4.0-20
CPK (UI/l)	168,8	20 – 100
Glycemia (g/l)	0.61	0.7-1.1
Oestradiol (Pmol/l)	16	21-649

Our results for this reveal that the participants have a high rateOf cortisol 33.98 µg / dl and CPK 168UI / accompanied by a remarkable decrease above of the normal levels of Oestradiol 16Pmol / l and 0.61g / l Glycemia (Table 5).

DISCUSSION

The purpose of this work is to explore in detail the morphological, hormonal and nutritional status of six female players having a functional hypothalamic amenorrhea, in order to prevent a possible energy deficit. According to the Coaching Association of Canada, Monthly cycle is considered as an indicator of the overall health and well-being of Sports women that with the interaction of many factors contribute to higher efficiency (Vicki, s. d.2011). In our study, we have

noticed that athletes have a weight, size, fat mass and a relatively low BMI, although football does not seem to promote thinness at all costs according to FIFA. The decrease of these parameters is one of the consequences of the under nutrition resulting from inadequate food habits and eating disorders. In our food survey, all athletes under study are worried about having lost control of what they eat and even come up with restrictive diets because of lack of self-confidence and low self-esteem. Our results corroborate with numerous studies which have shown that amenorrhoeic athletes show a decrease in weight, this leads to a decrease in energy reserves and seems to be one of the main causes of their decrease in fat mass (Martine Duclos., s. d.)(Boisseau, Duclos, Guinot, 2009) This led us to think that underweight act simply as an element of greater sensitivity to the unfavorable impact of the energy deficit on the ovulatory process (Adam, 2013)

Moreover, our results show that diet followed by our sportswomen is rich in Carbohydrates and low in fat and protein. It is pointed out that energy deficit can be facilitated by high-carbohydrate diets that are frequently recommended for high-level athletes who are deficient in more energy-rich nutrients such as lipids. These findings are consistent with Hilton's work. And Louks carried out in 2000who have shown the existence of amenorrhoea and a qualitative deficit of lipid intakes (12 to 15%) of the diet in athletes (L.K Hilton. & Louks, A.b, 2000).

However, the hormonal profile of our soccer players shows an increase in CPK concentrations, which is probably due to the intense effort submitted by the muscles of the players during training and competitions. It is known that during intense physical exercise, the CPK present in the skeletal muscle plays the role of an energy buffer in allowing the maintenance of a relatively stable ATP concentration, although this ATP is consumed very quickly. Similarly, a remarkable increase significant increase in cortisol compared with the usual values probably due to a low concentration of blood glucose and the constraining loads of the training sessions experienced by athletes justified by a low BMI. The adaptation to the effort by increasing the Availability of energetic substances by maintaining the blood glucose constant by stimulating Gluconeogenesis, increasing the mobilization of free fatty acids and decreasing the use of Glucose (Chiha fouad, 2009) In contrast, our athletes in AHF have low estrogen levels, due to a food diet characterized by insufficient lipid inputs, in this context several studies have demonstrated that the case of a restrictive diet where fats represent less than 20% of calories, occurs at once an alteration of estrogen secretion because cholesterol is the precursor of steroid synthesis. Our results Support those of Michelle *et al.* In 2008, those of Adam *et al* in 2013 and those of Martine (Adam, 2013) (Javed, Tebben, Fischer, & Lteif, 2013) (Patrice Lefebvre & Bringer, 2005b) (Martine Duclos., s. d.2016) (Michelle P. and all 2008).

CONCLUSION

Weight loss, with or without a low body mass index associated with a poor perception, her slimming and disorders of monthly cycles must evoke the diagnosis of eating disorders behavior. This situation is still to be treated to preserve the health of the athlete. The information of the athlete and that of her sports environment regards the risks are essential for the prevention

Screening may be considered during the onset of decreased performance, excessive exercise, fatigue, weight loss. A low fat mass, common denominator in sportswomen in amenorrhea biological profile of chronic energy deficit associated with the functional amenorrhea of the athlete characterized by a decrease in estrogens, Hormones of energy metabolism and increased cortisol to mobilize the energy substrate and glucose. The prevention of these disorders requires the training of the different actors in this field including: Clinicians, sports professionals and even family care seems a good indication. Prevention could involve training for Young athletes on the risks induced by restrictive behaviors.

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