

Sports Woman Triad Syndrome: Evaluation, Frequencies and Causes in Algerian Footballers

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RESUME

Introduction: Le niveau des compétitions sportives féminines a connu une croissance tellement marquée que la pression est devenue plus palpable poussant certaines athlètes à se lancer dans des régimes alimentaires déséquilibrés pouvant perturber leurs cycles menstruels. L'association entre troubles de l'alimentation et cycles menstruels irréguliers finirait par engendrer " la triade de l'athlète féminine". **Objectif:** l'objectif est d'évaluer la fréquence des troubles du cycle menstruel et de mettre en évidence ses causes chez la footballeuse algérienne. **Methodologie:** 44 footballeuses ont renseigné le questionnaire sur leur cycle ovarien pour l'analyse de la fréquence des troubles du cycle menstruel. Les sujets ont aussi réalisé des mesures anthropométriques et une enquête alimentaire. Les blessures subies par les footballeuses ont été recensées. **Resultats:** 12 footballeuses (27,27%) ont présenté des troubles du cycle dont 5 avec des antécédent d'aménorrhée, 5 avec des cycles irréguliers longs (≥ 35 jours) ou courts (≤ 24 jours) et 2 présentant à la fois des antécédents d'aménorrhée et des cycles irréguliers. Nos résultats ont apporté des valeurs du poids et de taille compatibles aux normes du football féminin. En comparaison avec les footballeuses normalement réglé (NR), les footballeuses présentant des troubles de cycles menstruels (TC) présentent un déficit énergétique associé à un IMC plus bas et un taux d'oestradiol réduit. Les athlètes (TC) présentent une fréquence de blessures plus élevé comparées aux athlètes (NR). **Conclusion:** La pratique du football a tendance à perturber le cycle menstruel des footballeuses (27,27%) pouvant suspecter le syndrome de la triade de l'athlète causée essentiellement par la baisse des apports énergétiques journaliers et confirmée par le pourcentage élevé des blessures subies.

Keywords: Menstrual cycle disorders, footballers, energy deficit, oestradiol, injuries

INTRODUCTION

The characterization of a player with a high level constitutes the best approach that allows the best guidelines for the preparation of the future footballer. Among the women footballers, the diversity and regular fluctuation of the sexual hormones associated

with the constraints of the requirements of modern football make the process of training more complex. The number of women who practice sport is increasing (Europe: $<10\%$ 1968, $>60\%$). However, the growing participation of women in sports activities has given rise to health problems (Hoch AZ and al 2009).

According to the medical commission of the I.O.C, the level of the competitions has known such a remarkable growth that the performer receives pressure. Looking for an ideal weight, some athletes have started draconian and unbalanced diets, taking the risk of serious food trouble such as anorexia or bulimia. These food disorders may result into a low availability in energy (even insufficient – unable to respond to the energy

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Website:
<http://sjsr.se/>

ISSN:
2001-9211

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expenditure) which can disturb the reproductive cycle then leads to amenorrhea. (Boisseau, N and al 2009) The association between food disorders and the irregular menstrual cycle causes a decrease in the estrogen, endogenous and other hormones, which gives birth to bone mineral density hence the expression "Female athlete triad." When the three components of the triad come to exist simultaneously, they have serious consequences on the athlete's health and can even threaten her life " adoption of a declaration of consensus on the triad of the woman athlete - News Olympic " 2016). Female athlete triad is a pathology that has many factors: Environmental, like nutrition, an intense exercise, or stress. (Otis CL and al 1997).

The disorders of the menstrual cycle constitute the most recognizable symptoms of the triad. Yet, they are rarely declared by sportswomen spontaneously because on one hand, they would live with it normally, and on the other hand, the medical corps considers it as normal since it is associated to the constraints of modern football. These disorders may make training more complex and detrimental (Adam 2013). The idea that the presence of a component of the triad induces that the presence of the other components is obvious (Golden NH and al 2002).

In literature, we find various denominations: FAT= female athlete triad, syndrome of female athlete triad (Nattiv A and al 2007).

The problem was defined for the first time in 1993 by the College of Sport Medicine. According to sports, between 16 & 52 % of young women are highly threatened by the triad (Hoch AZ et coll 2009) (Amanda K and al 2016) (Tara Tietjen-Smith 2008).

OBJECTIVE

The objective of this work is to evaluate the frequency of the disorders of the menstrual cycle and highlights their causes for the Algerian woman footballer.

SUBJECTS & METHODS

44 women footballers evolving in division I, and are between 20 & 28 of an average weight of 55.79 kg, an average height of 163.14 cm, with a weekly training between 9 and 11 in addition to the competition & the study criteria have accepted to take part in the study. The subjects have accepted to fill in the questionnaire

with information about their ovarian cycle for the analysis of the disorders of the menstrual cycle (Female Athlete Triad Coalition...2014). The subjects have also, actualized anthropometric measures for the estimation of the fat mass and the meager one (Frederic, M 2007) & food survey (BILNUT & the table of food components) a census of injuries sustained by the women footballers was fulfilled along the sports season.

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

Anthropometric Settings

The results show a corporal weight, body mass index for the women footballers (TC) significantly weaker ($p < 0.001$) than women footballers (NR) in contract, there is no significant difference in the lean body mass and fat mass between the two groups.

4 women footballers have presented an $IMC \leq 18 \text{ kg/m}^2$ corresponding to a stage of thinness. One woman footballer among these four has presented an $IMC \leq 16.5 \text{ KG/m}^2$ (16.35) corresponding to a criterion of undernutrition.

Frequency and Nature of the Menstrual Cycle Disorders

Among the 44 women footballers, 15 of them have presented regular cycles, 12 (27.27 %) Have presented cycle disorders 5 among them with amenorrhea antecedents, 5 with long irregular cycles (≥ 35 days) or short (≤ 24 days) and 2 presenting amenorrhea antecedents and irregular cycles at the same time.

Table 1: The anthropometric characteristics of sportswomen with a normal menstrual cycle (NR) and the sportswomen with disordered cycle (TC)

Paramètres	Footballers (NR)	Footballers (TC)
Corporal weight (kg)	61.3±6.64	57.54±7.45
BMI (kg/m ²)	21.58±1.74	19.36±1.29
Fat mass (%)	31.60±2.75	20.06±5.38
Lean body mass (kg)	25.41±3.36	30.35±5.26

NR: Athletes with a normal menstrual cycle TR: Athletes with disordered menstrual cycle BMI: Body mass index

Results of Hormonal Parameters

The realized amount of the oestradiol rate shows the weaker values for women footballers presenting disorders of the menstrual cycles (29.76) compared to the sports women having a normal menstrual cycle. (table n°3).

Results of Food Survey

The food survey has shown the following results

In comparison with women footballers having a normal cycle, the G.E.C is lower than the women footballers presenting menstrual cycle disorders accompanied with the decrease in the contributions of the lipids and the proteins against an increase in the carbohydrate contribution.

Correlation between the Energetic Results and the Regularity of the Women Footballers' Cycle

The results of the analytic study shows a strong correlation that is inversely proportional between the energetic results and the regularity of the menstrual cycles ($r = -0.522$, $p = 0.01$) as shown in table 5. The results plead for the existence of triad of the sports woman.

Frequency of Injuries Undergone by Women Footballers

On the occasion of their trainings like in the competitions, women footballers with disordered menstrual cycle have picked up more injuries (58,33%) compared to women having a normal cycle (33,33%).

DISCUSSION

Our results have brought weight and height values consistent with the standards of women's football as highlighted by (Dvorak and al 2011). In fact, it is a matter of having a typical body optimal, adapted to the energy and motor requirements of the discipline concerned. Which corroborates the results of Toumanion when it ensures that to achieve the sporting success, Have the constitution of a typical body.

The Results of BMI and % MG showed good physical fitness and reported specific literature. However, the differences between the soccer players and the control group remained insignificant. Our results are consistent with those of Dvorak and al 2011. Similarly,

the lean mass of our subjects is relatively high and this is probably due to the increase in the intensity of the training allowing a degreasing of the body of the soccer players, An increase in muscle mass and osseous thanks to repeated and varied mechanical stresses (Duclos and al 2010).

Compared to normally regulated (NR) soccer players, women with troubled menstrual cycles (TC) represent an energy deficit associated with a lower BMI and reduced oestradiol. Indeed, a restrictive food behavior leads to an energy deficit and leads to menstrual cycle disorders (Gottschlich and Young, 2006). The main cause of these disorders seems to be the endocrine adaptation of the body to restore energy homeostasis as evidenced by the association of the energy deficit with the low plasma estrogen content (Lefebvre and Jacques B. 2005) reported by our results Athletes (CTs) represent a frequency of injury especially stress fractures higher compared to athletes (NR). Athletes with functional hypothalamic amenorrhea characterized by hypoestrogenia present a risk factor for stress fractures.

In particular, the present invention is an augmentation of the osseous resorption, and a diminution of the reparation of micro fractures caused by the intensive exercise and repeat (Masson 2017). It is important to note that the adaptive adaptation of the tissues to the physical activity is more important than that of an economic deficit associated with the problems of menstrual cycles and that the equilibrium in the health of the population is stable. (Thissen and al 1994). Remind that the triad does not involve the coexistence of these three composers. 'In addition, the problems of the triad may diminish the physical performances and bring morality and mortality (Nattiv, A and al 2007).

CONCLUSION

The practice of football tends to disrupt the menstrual cycle of female footballers (27.27%) who may suspect the athlete's triad syndrome caused mainly by the decrease in daily energy intakes and confirmed by the high percentage of injuries suffered by soccer players. If the characteristics of Algerian footballers are similar to those reported in the literature, it is still important to prevent these athletes, their parents and their coaches from the dangers to which they are exposed. The best strategy remains the prevention of the triad through education.

Table 2: Frequency and nature of the menstrual cycle disorders of women footballers

N=44	17	15	12 (27,27%)		
			5	5	2
Profile of the menstrual cycle	Non-notified cycles	regular cycles	amenorrhea antecedents	cycle disorders: $24j \leq \text{Cycles} \leq 35j$	2 symptoms at the same time

Table 3: Comparison of the rate of oestradiol in the blood of the women footballers

N=35	Footballer NR (n=23)	Footballer TC (n=12)	T test
œstradiol	29.76±21.5	34.39±13.9	-0.75

Table 4: Comparison of the results of the food survey of sportswomen

Paramètres	Footballers (NR)	Footballers (TC)	Significance
% AET			
Protein	21±7.64	11.03±9.06	-8.414*
Lipid	23±11.91	20.62±11.23	-2.211*
Carbohydrate	55.62±14.62	68.33±16.85	-5.646*
Global energetic contribution (Kcal/j)	2067±383	1633.66±225	-1.392*

GEC: Global energetic contribution, *Significant

Table 5: Correlation between the energetic results and the regularity of the women footballers' cycle

Variables	n	r	p- value
Corrélation between energetic results & regularity of the menstrual cycles	44	-0.522	0.01

Table 6: Frequency of injuries undergone by women footballers

Training injury	(NR) (n=15)	(TC) (n=12)
yes	5	7
No	10	5
% of injuries	33,33%	58,33%

RECOMMENDATIONS

The present recommendations come from the findings of the study and recent consensus on the triad (2014 Female Athlete Triad Coalition Consensus: 1st international conference held, California 2012 + 2nd international conference held, Indiana 2013) What should be monitored?

First, it is important for the athlete and his/her living environment to be well educated about the triad. This

allows us to recognize the warning signs, but above all to avoid behaviors that can exacerbate the eating disorders of the athlete.

It is also paramount to make the complete history of the stress fractures or frank suffered by the athlete. Then we want to know the history of menstruation: Its regularity, its duration, etc. Finally, it may be appropriate to look at the athlete's social network. Is she under pressure to lose weight or win at all costs, does she have controlling parents? Is she socially isolated due to her sport? Is she a subject to punishment when gaining weight...etc?

When such behaviors are discovered, the evaluation must be immediately initiated and the athlete, coaches and caregivers must be met in order to establish a preventive strategy.

Prevention

Faced with such an insidious problem, the best prevention is the education of parents, coaches and athletes. Another very effective strategy for recognizing early signs of the disease is pre-participatory assessment.

Unfortunately, it is not mandatory in Quebec and schools, whether private or public, do not seem to be interested in taking the lead on this issue.

As a coach: Remind the athlete that eating is an important part of performance. Emphasize good lifestyle and health rather than body weight. Help the athlete get good resources in nutrition, psychology and medical service. Pay attention to warning signs such as repeated fractures.

As an athlete, you have a tremendous responsibility that begins by balancing performance and health. Make a schedule of your periods and consult a specialist if you observe any irregularities. The main cause of amenorrhea is pregnancy, but there are a host of other possible causes that deserve investigation. If you are regularly injured or undergo stress fractures, see also; have your training plan reviewed. Ask for help if you find that you are constantly looking for ways to lose weight or if you regularly consume "slimming"

supplements. To develop a diet that meets your needs based on your sport, a nutritionist can help. Finally, choose your living environment, do not be intimidated.

Treatment

When one of the elements of the triad is identified, an effective prevention strategy must be put in place. This should be based on a multidisciplinary approach including a nutritionist, psychologist, sports chiropractor, coach, parents and attending physician 6, 10. The first step is to increase energy intake 4. However, it is important not to make the athlete feel that you want to control him/her. The strong method will not be useful. Although it can be prohibited from participating in competitions, the athlete may still train on his or her side.

We must convince her to gradually reduce her training volume until her periods return. She should be encouraged to eat enough to meet her needs and to take supplements of calcium (1200-1500 mg), vitamin D (400-800 IU) and potassium (60-90 mg). Hormone therapy can be considered, but no research has demonstrated its effectiveness for this problem. 12 In addition, CMHA does not recommend taking contraceptive pills or hormonal supplements in athletes with the triad. It is rather suggested to promote the resumption of menstruation naturally. Biphosphonates do not appear to increase bone mass and should not be used in pre-menopausal women. Let us remember that no medicine can restore the lost bone mass.

The measurement of body weight should be performed as rarely as possible and discontinued as soon as the patient has reached a sufficient weight. It is more important to put emphasis on making good lifestyle habits. Being surrounded by friends during workouts and meals can promote healthy habits. The long-term consequences are significant and include osteoporosis of course, but also osteoarthritis and joint disorders due to multiple fractures. That's why the best strategy is prevention of the triad through education. Health and fitness professionals should learn about the topic and promote training in their workplace and with their patients.

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