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Article · March 2018

DOI: 10.5281/zenodo.1210598

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## THE SYNDROME OF OVERTRAINING AMONG THE ALGERIAN ELITE JUDOKAS (YOUNGER MEMBERS OF THE ALGERIAN NATIONAL TEAM) DURING A COMPETITION FOLLOW-UP

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### Abstract:

**Introduction:** The main objective of this study is to detect the existence of a state of fatigue and a syndrome of overtraining among Algerians judokas of the youngest category (girls and boys) by the use of the questionnaire of fatigue among the child athlete (QFES) and to evaluate the variations of the score by report has its 07 dimensions. **Method:** 24 judokas cadets of the national team, 14 boys 58.3% and 10 girls 41.7%. The boys are an average age of 16.21±0.21 years, an average weight of 67±16,40kg and a stature of 171,64±9,49cm. They have a body mass index(BMI) of 22.69±4.94 kg/m<sup>2</sup>. girls have an average age of 16.20±0.78 years, a weight of 59.1±7.89 kg and a stature of 163.9±3,14cm. The BMI is equal to 21,95±2.50 kg/sq. m. The athletes are attending school between the fourth average year at the College and the second year of secondary school. During the period of the microcycle stage of competition which is taking place between 01 March 2017 and 31 May 2017, we distributed the questionnaire at the end of the competition at the Championship in Algeria (Algiers, 27/05/2017). **Results:** The score of the questionnaire was to 40.01±8.58 (minimum=27, 00, maximum=54), 33.33% of athletes their scores to the QFES≥45. The average score for an item is 1.1±0.11. The ranking of items of the QFES by average quotation with significant threshold retained of p<0.05. The results are expressed in average ± standard deviation. **Conclusion:** The main results show that in the questionnaire QFES fatigue is a sensitive tool to detect a state of fatigue. However, a biological study is imperative in order to establish the correlation between syndrome of the overtraining and oxidative stress among young judokas

**Keywords:** fatigue, syndrome of overtraining, physiology, psychophysiology, adolescents

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## 1. Introduction

Sports practice for the maintenance of physical fitness differs from the search for a sporting performance. To achieve this goal athletes and coaches are engaged in intensive training sessions with consequent and inadequate loads compared to the recovery. Even in certain disciplines with dietary restrictions that affect the athlete's health.

Some athletes complain about a chronic fatigue that lasts by time several weeks where the appearance of the term syndrome of the overtraining appears. In this context, many works demonstrate that the increase of the load of the physical work leads to the fatigue, but it is subjective because it is felt by athletes at the muscular level, or generally at the sensory, intellectual and psychological level (Weineck, 1997).

This fatigue is considered as a protective effect which warns the athlete of the necessity to recover. If it installs in a chronic manner (Chennaoui et al 2004) it will become pathology. According to (Mtveiv, 1983) this state of chronic fatigue is caused by an imbalance of the intensity of the effort and the recovery. It's called the overtraining, "*It is a physical strain of an abuse of physical activity by a subject.*" "*It is the result of an increase inadequate of the load*" said (Aissa K., 2006 p.70). It actually corresponds to significant biological changes in which the starting point is the muscle tissue. This phenomenon has an erythroptic impact that is characterized by iron deficiency, B, B<sub>6</sub>, hemodilution, hemolysis, functional myelodysplasia (Laure P, Dine G, 2001); (G. Dine, O. Corpel a, O. N'guyen a, C. Gindre, a, V. Genty, 2008). It also has an impact on certain trace elements that results a deficiency of magnesium, calcium, and phosphorus causing ionic disorder, protein catabolism, and muscle destruction, hormonal dysregulation (Rietjens G J, 2005).

### 1.1 The terms of overtraining syndrome, overreaching

These concepts have been distinguished by (Morton, Ferry, & Keast, 1991 and R. Kuipers, H.; Keizer, H. A., 1988). They affirm that the overtraining characterized by a state of fatigue, has an intensive drive to the point that is observed, a recovery period to regain its potential to work, and by a decrease in performance.

The syndrome of the overtraining is characterized by decreasing in performance and is accompanied by one or some biological symptoms. The duration of recovery is long. When the protrusion (overreaching) follows, a short period of overtraining, the symptoms disappear after an interval of intermediary recuperation. "*There is a continuum between the sign of fatigue related to the training and those which go with the syndrome of the overtraining which makes it difficult to distinguish the two states: the neuroendocrine components and the metabolic components*" (Morton, Ferry & Keast, 1991).

On the Gueznec, Satabin, Legrand, & Bigard, 1994 research work entitled "*The mechanism of syndrome of the overtraining*" two concepts were opposed to explain it. First, the metabolic concept is caused by a decline of energetic reserves which will subsequently be responsible for neuroendocrine changes and behavioral (Costile, Flynn,

& Kirwan, 1988). The second is caused by the hormonal responses to the excesses of the muscle work which entails the insufficiency metabolic.

Petibois C., Cazorla, Deleris, & Gim, 2001, Bricout, et al., 2006 have biologically exposed this phenomenon by experimental hypotheses. The hypothesis of muscle structure by calling into question the action of free radicals, the hypothesis of the membrane permeability of muscle cells, the third linked to carbohydrate metabolism and the oxidation of amino acids, an immune and inflammatory hypothesis

## 1.2 How to diagnose this phenomenon?

Several studies in this direction have been realized. "La Societe Francaise de Medicine du sport" "French Society of sport Medicine" submitted a questionnaire of overtraining including 54 items comprising 7 dimensions (Flora, Srazzin, & Favre-Juvin, 2003), (Bricout, 2003)

- Sport performance;
- Symptoms;
- Appetite and sleeping;
- Motivation;
- Attention and concentration;
- Rational behavior;
- Anxiety and trust;

These aspects are for the adult sports. Are they the same for children and adolescents?

It is well known that the physical activity and sport is indispensable in the life of young children and adolescents, for a harmonious development of various functions of the organization both on the biological and psychological plan (Blair, Cheng & Holder, 2001). The achievement of a sporting performance among young people is probably not without consequences with the apparition of certain pathologies, even on the psychological plan from intensive training (Bricout, Charrier & Favre-Juvin, 2008). For them the term fatigue or poor form is better used than the overtraining term for young children and adolescents. A questionnaire has been developed and validated by the "La Societe Française de medecine du Sport" (The French society of sport), and "La Societé Française de Pédiatrie" (The French society of Pediatric) (Bricout & Favre-Juvin, 2006). It contains 30 items and seven dimensions quote in the questionnaire of the overtraining of the "La Societe Francaise de Medecine du Sport".

Thus, there was a little study on the fatigue and the syndrome of overtraining among adolescents (Bricout & Favre-Juvin, preparation and validation of a questionnaire about fatigue among children sporting, 2006). The use of this questionnaire has been the subject of few studies. We can also mention the studies of Bricout, Charrier, & Favre-Juvin, 2007 and Winkler, Thoreux & Lhuissier, 2016.

Several studies on adolescent gymnasts believe that an intensive training inhibits the growth of children and adolescents; it would be interesting to study such implications among judokas. Judo is a sport characterized by dietary restrictions and

intense sports training especially for elite athletes who prepare both national and international competitions.

For the preliminary study on the judokas cadets of the national team of Algerian judo, we have submitted a questionnaire about fatigue among the child athlete to evaluate the state of fatigue and to respond in a scientific way to the interrogations in order to find answers to the problematic of our thesis.

## 2. Tools and Methods

### 2.2 Subjects and sample

Sample: 24 judokas cadets of the Algerian national team

14 boys 58.3% and 10 girls 41.7%. For boys aged 16-21 years old  $\pm 0.21$ , weight  $67 \pm 16,40$  kg their  $171,64$  size  $\pm 9,49$  cm, BMI  $22,69 \pm 4.94$  kg/m<sup>2</sup>, for girls  $16.20 \pm 0.78$  years, weight  $59.1 \pm 7.89$  kg, their size  $163.9 \pm 3.14$ , cm  $21,95 \pm 2.50$  kg/m<sup>2</sup>,

All of these international athletes who participated at least in 5 competitions during the 02 months preceding the questionnaire with a participation in an African championship of Nations and 04 competitions in a championship in Algeria, were all safe, no consumption of medicines, they were all students in middle (fourth year) and secondary school (second year).

The questionnaire of fatigue among the child athlete QFES: during the period of the micro cycle stage of competition which was unrolled from March 1 till May 31, 2017, we distributed the questionnaire at the end of the competition of the championship in Algeria (Algiers, 27/05/2017) just after the African Championship of Nations in Egypt, 2017.

### 2.2. A description of the questionnaire of fatigue among the child athlete QFES:

It is composed of two parts: the first part was an introduction questionnaire carrying the name and first name, age, sex, class, number of sessions and hours of training, the difficulty of training, the level of practice, the results in school, sports results, medicines taking and family events.

The second part is a self-questionnaire composed of 30 closed question on "the state of fatigue felt by the child or adolescent during the 15 days by which the subject can answer by one single answer" «never», «only once», a few times», «often enough», «very often». Each answer is respectively scored by 0, 1, 2, 3, 4 points. The maximum score is 120, it evaluates 7 Dimensions: Sport performance, Symptoms, Appetite and sleeping, Motivation, Attention and Concentration, Rational behavior, Anxiety and trust. In reference to the score of the overtraining of the adult, the threshold of 45/120 has been defined as the limit from which it is advisable to carry a particular attention to the child in terms of fatigue" (Winkler, Thoreux, & Lhuissier, 2016), (Bricout & Favre-Juvin, 2006)

### 2.3 Statistical processing

The results obtained from the replies of the QFES have been in EXCEL File. The statistics analysis have been carried out with the SPSS program.22.0 with significant threshold retained of  $p < 0.05$ . The results are expressed in average  $\pm$  standard deviation. For the analytical study, we have used the correlation of Pearson between the answers of the introduction of the questionnaire and the dimensions of the questionnaire.

### 3. Results

Data collected from the introduction of the QFES have allowed us to deduce the following information.

The number of hours per week of trainings is  $12.08 \pm 2.24$  hours. The number of sessions was  $5.95 \pm 0.85$  per week. 100% of its athletes have a single main activity which is the judo they do not practice any other physical activity. All the international athletes participated at least in 05 competitions during the 02 months preceding the questionnaire in the Games of Africa of nations, and in 04 competitions of the championship in Algeria. During the 15 days preceding the questionnaire, the practice of the activity there seemed to be difficult among all the athletes, 80% have observed a decline in their school results, 15% have observed a stable State whereas 05% have observed an increase in their school results. But in term of performance, 50% have observed that their performance remained stable. 30% have made part of a decrease, and 20% have expressed an increase in their performance. 100% of the athletes said that they were not sick, didn't consume medicines, with no family events which disrupt.

#### 3.1 The QFES

The score of the questionnaire was to  $40.01 \pm 8.58$  (minimum=27.00, maximum 54), 33.33% of athletes their scores to the QFES:  $\geq 45$ . The average score for an item is  $1.1 \pm 0.11$ . The classification of items of the QFES by average ratings assigned by the athletes is by dimensions is represented on the table cores to the QFES  $\geq 45$ . The average score for an item is  $1.1 \pm 0.11$ . The classification of items of the QFES by average ratings assigned by the athletes is by dimensions is represented on the Table 1.

**Table 1:** Maximum Scores possible, the minimum and maximum observed by the Dimensions

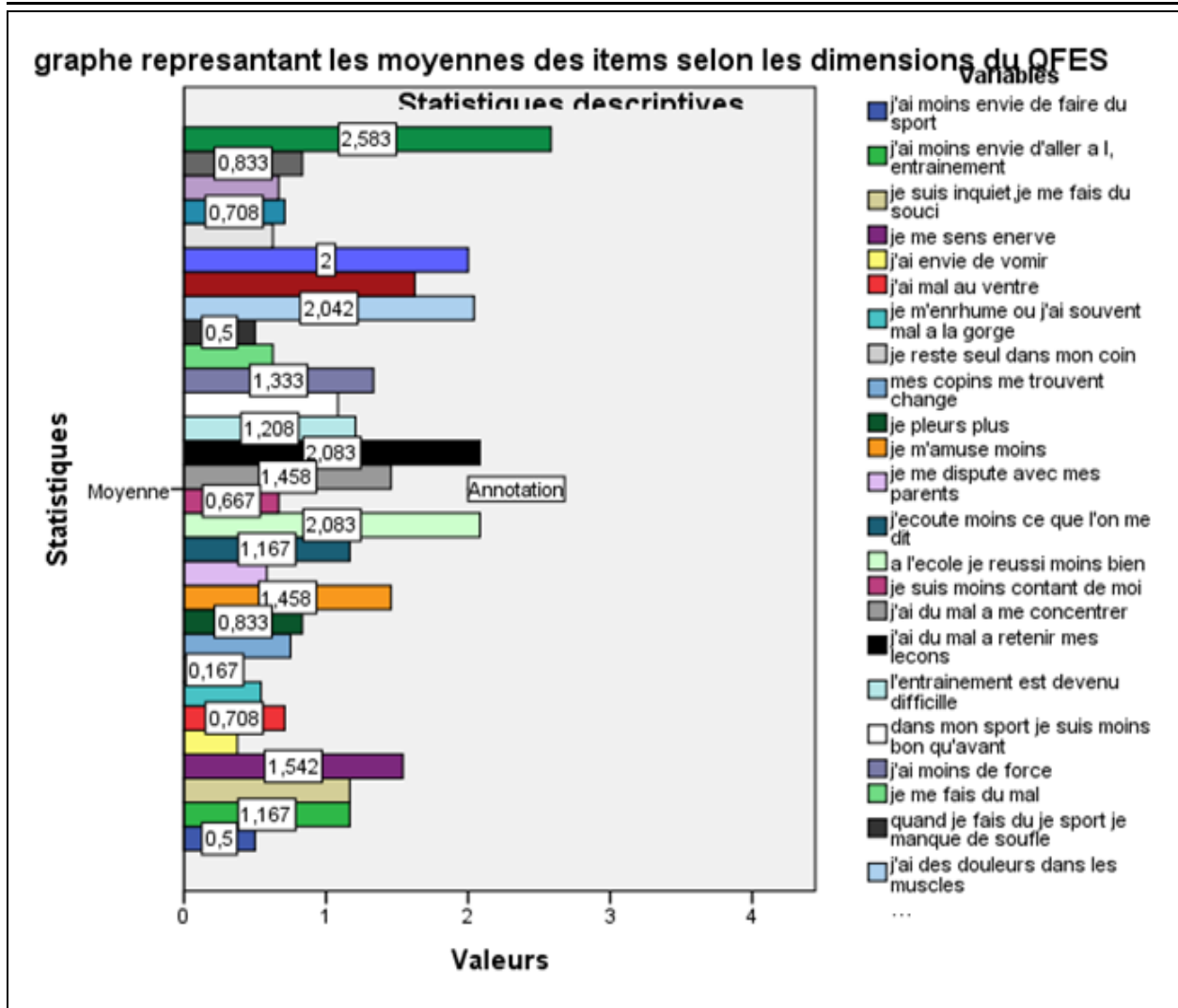
	Motivation	Anxiety and trust	Symptoms	Rational behavior	Attention and Concentration	Appetit and sleep	Sport performance
Max score possible	8	8	12	24	16	20	32
Mini Score	00	00	00	00	00	00	00
Notes							
Maxim score notes	05	05	06	11	14	07	20
Score $\pm$ standard deviation	$1.66 \pm 1.68$	$2.7 \pm 1.68$	$1.62 \pm 1.4$	$4.91 \pm 3.37$	$6.29 \pm 4.24$	$4.75 \pm 1.7$	$10.41 \pm 5.66$
% Of Max obtained	20.75%	33.75%	13.5%	20.45%	39,31%	23.75%	32,53%

The analyses of correlation between the parameters of the introduction of the questionnaire and the score, dimensions of the QFES indicates the existence of coefficients of significant correlation the thresholds of probability  $p < 0.05, p < 0.01$ . Its same thresholds have been observed during the correlation between the dimensions of the QFES and the score, size, weight, BMI.

However, there is a single parameter that is correlated with no dimension or score, it is the age. Correlations are presented in the tables 04, 05 has coefficients of significant correlation the thresholds of probability  $p < 0.05, p < 0.01$ . Correlations are presented in the tables 4,05 has coefficients of significant correlation the thresholds of probability  $p < 0.05, p < 0.01$ .

**Table 2:** Averages and standard deviation of the items of the QFES, maximum and minimum of the values

	N	Minimum	Maximum	Average	Standard deviation
I feel less in the form	24	0.00	4.00	1,6250	1,27901
I listening less what is said to me	24	0.00	3.00	1,1667	1,12932
My friends find me changed	24	0.00	3.00	,7500	1,03209
I have less hungry	24	0.00	3.00	,6250	,92372
I am concerned, I am concerned	24	0.00	4.00	1,1667	1,16718
I have difficulties has put me to sleep	24	0.00	4.00	,6667	1,00722
I want to vomit	24	0.00	2.00	,3750	,76967
In my sport I am less good than before	24	0.00	3.00	1,0833	1,10007
I get cold rather often or I have a sore throat	24	0.00	2.00	,5417	,65801
I evil has to retain my lessons	24	0.00	4.00	2,0833	1,52990
I feel fatigue	24	0.00	4.00	2,0000	1,02151
I have pain in the muscles	24	0.00	4.00	2,0417	1,23285
I crying more	24	0.00	4.00	,8333	1,27404
I have the wrong has to concentrate	24	0.00	4.00	1,4583	1,31807
When I do sport I lack of breath	24	0.00	2.00	,5000	,78019
I remain alone in my corner	24	0.00	2.00	,1667	,48154
I biker all the day	24	0.00	4.00	,8333	1,20386
I amuse less	24	0.00	3.00	1,4583	1,25036
I am of the Evil	24	0.00	4.00	,6250	1,13492
Has the school I passed less well	24	0.00	4.00	2,0833	1,41165
I have less force	24	0.00	3.00	1,3333	1,16718
I have less desire to go to the drive	24	0.00	4.00	1,1667	1,52277
I want to stay in bed	24	0.00	4.00	2,5833	1,52990
I feel exercised	24	0.00	3.00	1,5417	1,14129
I have a stomach ache	24	0.00	2.00	,7083	,85867
I dispute with my parents	24	0.00	3.00	,5833	1,01795
The training has become very easy	24	0.00	3.00	1,2083	1,14129
I am wake up at night	24	0.00	3.00	,7083	1,04170
I am less content of me	24	0.00	4.00	,6667	1,04950
I have less desire to make of sport	24	0.00	4.00	,5000	,93250



**Table 3:** Correlation between the introduction of the QFES and dimensions, score of fatigue

		NH	NSH	Score	Mb	AC	CR	Vac	PS	Its	SY
NH	Correlation		,950*								
NSH	Correlation	,950**									
Score	Correlation				,647**	,520**	,542**	,461*	,664**		,448*
Mb	Correlation			,647**					,612**		
AC	Correlation			,520**				,561**	,488*		
CR	Correlation			,542**							,468*
Vac	Correlation			,461*		,561**			,698**		
PS	Correlation			,664**	,612**	,488*		,698**			
Its	Correlation										,444*
SY	Correlation			,448*			,468*				

NH: Number of hours, NSH: Number of meetings per week, MO: Motivation, AC: Anxiety, trust CR: rational behavior ACC: Attention and concentration, PS: sport performance, Its: Sleep and appetite, SY: Syndromes



**Table 4:** Correlation of dimensions, score and BMI

		Score	Mb	AC	CR	Vac	PS	Its	SY	T	P	Bmi
Score	Correlation of Pearson		,647**	,520**	,542**	,461*	,664**		,448*	-,539**	-,575**	-,489*
Mb	Correlation of Pearson	,647**					,612**					
AC	Correlation of Pearson	,520**				,561**	,488*			-,458*	-,680**	-,696**
CR	Correlation of Pearson	,542**					,159		,468*	-,539**	-,501*	
Vac	Correlation of Pearson	,461*		,561**			,698**					-,449*
PS	Correlation of Pearson	,664**	,612**	,488*		,698**					-,523**	-,580**
Its	Correlation of Pearson						,011		,444*		-,410*	-,423*
SY	Correlation of Pearson	,448*		,133	,468*		.004	,444*				
T	Correlation of Pearson	-,539**		-,458*	-,539**						,782**	,512*
P	Correlation of Pearson	-,575**		-,680**	-,501*		-,523**	-,410*		,782**		,932**
BMI	Correlation of Pearson	-,489*		-,696**		-,449*	-,580**	-,423*		,512*	,932**	

\*\* . The correlation is significant at the level 0.01 (bilateral).

\* . The correlation is significant at the 0.05 level (bilateral).

Mb: Motivation, AC: Anxiety, trust CR: rational behavior ACC: Attention and concentration, PS: sport performance, Its: Sleep and appetite, SY: Syndromes, BMI: Body Mass Index

#### 4. Discussion

The scores obtained by the QFES were of the order of 40,91±8,58/120 which were close to the alarm bells which is 45/120. Then, we can say that our subjects have a syndrome of overtraining, or fatigue which is probably not negligible and can be deleterious for children and adolescents in sport. So the athlete needs to be taken care of (Bricout & Favre-JUVIN, 2006).

The number of hours of training in the introduction of the questionnaire is 12,60H±3.13 per week, thus, we believe that this volume is high for this age group referring to the study of (Olivier, 2003). Who believes that the limit of hours of trainings is 08-10 hours per week, exceeding the threshold of 10-12 hours per week, a slowdown in growth is observed in some children and adolescents.

The results obtained during the studies of (Bouix, et al., 1996), (Bricout, Charrier, & Favre-Juvin, 2008) demonstrated that during the periods of competition or preparation, the scores were increased by the fatigue, whether by the overtraining questionnaire of the French Society of Sports Medicine or by the QFES. Their results underlined an important role of extra sporty constraints in the fatigue of sporty adolescents. The care is more than necessary for the athletes because a risk of injury is

considerable. In a limited practice in the hourly volume of 08-10 hours a week, the study of (Winkler, Thoerux & Lhuissier, 2016) demonstrated that the scores of 29.9 / 120 at QFES of 276 students aged between 11-16 years in sports section, practicing 11 different sports. Preschool students had a higher risk of having injury.

A precocious specialization in only one sport activity presents a high risk of injuries. The subjects of our study specialized precociously in the activity have a high risk of injuries referring to the study of (Winkler, Thoerux & Lhuissier, 2016), (Jayanthi, Labella, Fischer, Paulska, & Dugas, 2015). The scores were higher for girls than boys. This phenomenon is frequently observed when using the fatigue questionnaire, it is explained by the fact that the training groups are mixed and do not make any difference between the sexes. This is what corresponds to our study, then girls feel more strongly the physical fatigue induced by the training load (Bricout, Charrier, & Favre-Juvin, 2008)

During our investigation of the questionnaire, we observed the following dimensions close to the maximum scores that can be obtained:

- The motivation;
- Anxiety and confidence;
- Attention and concentration;
- Sport performance.

Referring to studies and definitions of overtraining or fatigue, its dimensions are the most important factors in the psychological studies of fatigue. To put the light on the fatigue of our study, it is imperative to enlighten it psychologically, and physiologically. The practice of judo in competition requires a high physical level, for a fight, time is 03 seconds up to 08 minutes for the boys and girls. They are characterized by a great intensity, long, a lot of movement, and of commitment to obtain the victory, the mental aspect, psychological are also the principal factors (Emerson, Giro, David, & Guilherm, 2013)

#### **4.1 The Psychological Factors**

In sport psychology, the term exhaustion is the most used "*exhaustion in sport and physical activity as a syndrome of great fatigue/emotional, a decrease in the importance of sport and a decline in athletic achievement*" (Richard, 2005, 322). The syndrome of overtraining corresponds to an unsuitable behavior likely to cause a drop in shape. Researches and studies have identified the psychological symptoms of sports exhaustion as a loss of appetite, libido, insomnia, increased sensitivity to rum, respiratory infections, depression, fatigue, loss of self-esteem, and deterioration of relationships with others.

The psychological factors are designated as the factors of tiredness, particularly those related to the stress, in some children anxious sport manifestations were evoked (Carrier, 2000) which has the excessive importance to give to the competition and to the victory, the fear of losing or disappointing young athletes. The explanation of the dimension of anxiety and confidence of our study by the presence of a repercussion is linked to a "Burnout" which is attached to an intense sport practice as well as

overtraining and multiple competitions. Generally, this state of anxiety and overtraining is linked to sports endurance.

Ouakil, Michel, Baup, Mouren, & Simeoni, 2002 explain the results and scores obtained by the questionnaire. Gould, Tuffey, Udry, & Loher, 1996 and Vealey, Udry, Zimmerman, et al, 1992 have demonstrated the same observations among no professional athletes which confirm our results of the correlations between the dimensions quoted and the score of both the fatigue and the correlation between the dimensions themselves. (Richard, 2005, p.25) evoked a great relationship between motivation, self-esteem. The observations obtained differed in relation to other studies because the individuals do not develop the same symptoms which explains the difference of the results to find and those of them Bricout and Winkler.

#### **4.1.1 Disorders of the food behavior (TCA)**

Studies evoke eating behavior disorder as a strategic point in the psychology of sport. The teenage phase of TCA (anorexia, bulimia and atypical disorders) emerges (Christenssen, Ulrich, Ferey, Schmid, Milos, & Simone, 2015). TCAs are more frequent among sports adolescents, for high level judokas in a SCOOF test + 70% of them have a prevalence of developing an athlete anorexia of 40%, whereas the sedentary showed no signs, the TCA disorders are more common in adolescent girls than in adolescents boys (khalifouni, Bensaleh, Ousmail, & Haouas, 2016), this anorexia athlete is due to dietary restriction for maintaining the category. This explains the correlations between dimensions and score with the body mass index.

#### **4.2 The physiological factors**

The dimension of the sport performance we observed for the items "I have pain in the muscles", "I have less strength" this sensation of pain or poor form is a sign of overtraining which is explained by the response of the body afterwards. An intensive work that is the result of the accumulation of metabolites and the elevation of lactate concentrations in the judokas blood's (Daniele, Juliano, Emerson & Saray, 2015).

In a study of muscle damage linked to fights and their impact on the markers of fatigue. Observations made on 20 athletes who participated in at least 3 high-level tournaments Brazilian aged of 20.7 years  $\pm$  4.6 distributed as follows 2 in (-55kg), 05 (-60kg), 4 (-66kg), 03 (-73kg), 02 (-81kg), 02 (-90kg), 02 (100kg). After 3 successive fights, a fatigue appeared in the upper and lower limbs which is reflected by the changes in the blood serum significantly in creatine kinase CK, and in lactate dehydrogenase LDH which will be the cause of the damage.

During an isometric exercise, in a single muscle study the maintenance of the voluntary contraction is difficult and the observation of a declaim of the force is observed. The relation between fatigue and overtraining is due to a balance imbalance which is facilitated by chrono-biological and psychological constraints. Factors are responsible for hormonal changes by a reduction in sexual steroids or the hypothalamo-pituitary adrenergicans

Metabolic and hormonal influences cause changes in cerebral activity of neurotransmitters. The changes mentioned are responsible for the decline of the physical performance as well as the decreases in serotonin. (Sesboue & Guincester, 2006).

*"Fatigue is a result of exhaustion of the energy reserves of contractile muscle cells. The saturation of oxygen transport mechanisms and the insufficiency of the cardiovascular system accentuate demand and supply. Fatigue is a concept that refers to a dysfunction of the neuromuscular system"*. It can be explained in children and adolescents by muscle mass, muscle typology, metabolism, and neuromuscular activation, its qualitative factors are attributed in the ability to resist fatigue. It can be explained in child and adolescent by muscle mass. (Van Praagh, 2008, p.225) In a comparison between boys and girls (Van Praagh, 2008) to report the study (Yangiya, Kanehisa, Kouzaki, Kawakami, & Fukunga, 2003) adolescents age 16,4 years. After 10 sprints of 05 sec and intervals of 10 sec the boys had a significant drop in absolute mechanical power absolute which is related to the lean mass of the lower limbs of boys.

Muscle typology is the result of the hypothesis of several studies that describe in children a lower percentage of fiber (type02) which explains the difference in resistance to fatigue which confirms the studies of (Colliander, Dudley, & Tesch, 1988), (Hultman & Greenhaff, 1991) during an intense, intermittent exercise, the muscle fibers (type02) generate greater fatigue which would be due to the inability of these fibers to resynthesize ATP from a rapid depletion of PCr reserves, and an insufficiency of glycogenolysis to compensate for the production of ATP. For the child, the muscle composition (type 01)is mainly confirmed by the study of (Oertel, 1988) which showed that the proportion of fibers (type 01) was 54% at 06-10 years 47% at the age of 10-15 years, 42% at 15-20 years in the vastus lateralis. These studies have been reported in the book (Van Praagh, 2008)

To explain also this muscular fatigue we have made the conclusion of (Costill, Flynn, & Kirwan, 1988) that the subjects unable to maintain their glycogen reserves had manifestations of overtraining. As far as the exhaustion of energy reserves comes from carbohydrate metabolism, the use of lipid and protein substrates is solicited.

The metabolism of protein by its importance and its direct reaction with the fatigue which is characterized by the presence of a link of the metabolism of amino acids and the availability of some central neuromediator implied in the fatigue by the central serotonin. The latter is strongly implicated in the regulation of appetite; the increase in serotonergic tonus exerts an anorectic and anxiogenic effect (Chaoulouf, 1989).

Another hypothesis is that it is probably a cause of fatigue which is the oxidative stress due to the action of the free radicals which is translated during an intense exercise, endurance or speed, particularly eccentric, alterations of the cellular structure of the muscle can appear. Metabolically, highly reactive free radicals are formed from oxygen from the oxidation process. However, the action of radical lipid peroxidation has the major consequence of increasing the permeability of the membrane of the

muscle cell. Creatine kinase, myoglobin, troponin I, 03methylhistidine are released into the interstitial medium. (Petibois, C, Cazorla, G, Deleris, G, Gin, H, 2001)

## 5. Conclusion

QFES questionnaire responses are subjective for the detection of a state of fatigue and the presence of overtraining syndrome. During the responses by the athletes, we felt a restriction and even we thought that the answers were not specified for fear of losing their place in the national team. In the view of the main hypothesis of our study which is in the process of realization to stipulate, an existence of correlation of overtraining syndrome and oxidative stress in young athletes is the same as in adults. In this sense, we will perform hematological, biochemical, ionogramme, and hormonal tests during the sporting years.

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