ORIGINAL ARTICLE

PLASMA CONCENTRATIONS RESPONSES TO STRENGTH-VELOCITY TRAINING IN POSTPUBERTAL CONGOLESE JUDOISTS

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Abstract

Objective: To evaluate the effects of a drive of the strength-velocity type on the evolution of the serum concentrations in juniors judoists by the Congolese national elite. **Methods**: The study, observational and experimental, proceeded of January 19 at July 19 2012 in Brazzaville (Congo). It carried on 14 boys of the national junior team. Their median age was 16 years (extremes: 15-17 years). All the subjects were subjected to a drive at dominant force-speed. Three bloods taking away were carried out on each subject: at the beginning, semi-course (3 months) and the end of the program (6 months). The given values were the serum concentrations in glucose, lactates, magnesium, triglycerides, total cholesterol, total fatty acids and CRP. **Results**: At the end of the program of drive, a significant fall of lactatemia (-63.5%), glycemia (-36.1%) and triglyceride concentrations (-23.4%) were found. On the other hand, a rise was noted for CRP (+60.0%), total cholesterol (+10.4%), the total fatty acids (+8.6%) and the magnesemy (+6.8%). During the phase of recovery, the speed of elimination of lactates depended on the category of weight (fast at light and slow one at the heavy ones). In addition, the kinetics post-exercise of the various serum concentrations varied from one parameter to another. **Conclusion**: The drive strength-velocity is associated modifications of serum concentrations in the juniors judoists high level, being able to be induced by the age of the subjects and suggesting this strategy as adapted for the improvement of the performance.
Keywords: *Serum Concentrations, Judo, Drive Strength-Velocity, Teenager, Congo.*

1. INTRODUCTION

The judo is martial art, found Olympic since the Olympic Games of Tokyo in 1958. Technical and strategic sport, it causes a significant energy expenditure associated with a drive with 25 to 30 hours weekly on a high level [1]. This makes it possible to the judoist to acquire a facility to carry out, overcome the difficulties and to optimize explosive movements and speed [2]. Such a volume of work can then have consequences not only morphological [3], but also physiological [4]. In the subject mast or adult, biological markers (metabolic and hormonal) testifying to the constraint imposed on the organization by the high level drive were proposed [5]. Indeed, at the time of the exercise, several mechanisms are potentially responsible for the variations of the markers plasma : increase in the affinity of haemoglobin (Hb) for oxygen, lowers pressure partial of oxygen (PO_2) in renal arterial blood, reduction of renal blood flow [6], modification of 2, 3-diphosphoglycerate (DPG) erythrocytaire, development of an expansion of plasmatic volume (VP) [7], lowers mass of the red globules (GR.) or blood concentration in Hb [8]. However, these modifications are attenuated by antagonistic mechanisms, in particular a negative effect being able to result from acidosis of a metabolic or respiratory origin, this one tending to develop more particularly at the time of a maximum exercise [9]. With regard to the child and the teenager, these markers were studied little, and very few works were devoted to a biological assessment associating biochemical parameters. Moreover, the listed data are contradictory [10, 11]. From the point of view of the organization of the next African Games of 2015 in Brazzaville and within the framework of the changing of the current team of the seniors of the Congolese judoists, the adaptation of the mode of drive strength-velocity by the technical experts of the national junior team suggests the following question of research: does the drive strength-velocity deteriorate the serum concentrations of the old judokas from 15 to 17 years, have regard to their puberty maturity in course? From where this work which is fixed for goal to contribute to a better knowledge of the biochemical adaptations at the time of a drive in strength-velocity in the Congolese judoists old from 15 to 17 years. Are the objectives specific assigned to this work to evaluate and follow the evolution of the rates of concentration of serum lactates [La], of the glycemia [Gl], of the

cholesterolemy, lipidemy and the magnesemy [Mg] front, with semi-course and after the program of training ? In addition, the kinetics of the lactatemia at the time of the period of recovery is also studied.

2. MATERIALS AND METHODS

Standard and tally of the study it acts of an observational, experimental study and of longitudinal type, carried out in Brazzaville (Congo) of January 19th at July 19th 2012, within the Sporting and University Center of Makelekele (CSUM). It is the only site of regrouping and training of the national teams of the country. Subjects the population source was made up of the Congolese judoists old from 15 to 17 years, of male sex. It was summarized on the judoists preselected for the training of the national team of judo within the framework of the preparation of the African Games of 2015 in Brazzaville. The starting sample, fixed at 35 judoists by suitability, rested on criteria of selection retained by the national trainers and on the rules enacted by the International Federation of Judo. These judoists came from Brazzaville and Pointe-Noire. With the resulting one from an examination medico-sportsman, 21 judoists were recruited. This assessment included/understood a anamnese, examinations cardiovascular (taken blood pressure, electrocardiogram, echocardiogramme), a pulmonary radiography, respiratory examinations (respiratory frequency, FR) and ventilatory (VO_2, VCO_2, VE, VT, VO_2 max), blood examinations of routine, including/understanding a hemogramme (VS, NFS, a total number of erythrocytes, a total number of plates, rate of hematocrite, average globular volume) and a biochemical assessment (glycemia, lactatemy, magnesemy, …..). A team of seven (07) judoists, each one of them belonging to the 7 categories of weight retained by the International Federation of Judo, 14 judoists constituted the sample of the study. Those were divided into two groups: group 1 (G1), the titular's; group 2 (G1), the reserves. Because of the work par even, obligation to engage a judoist of reserve by category and to increase the volume of work, a team of 21 other judoists was made up, the latter, also answering the criteria of inclusion. However, only the subjects of groups 1 and 2 (n=14) constituted the final sample of the study. The distribution of the judoists in the groups 1 and 2 was carried out by the trainers, by taking account of their gauge (in particular size). The median age of the subject from the groups 1 and 2 was 16 years (extremes: 15-17 years). These subjects examined by a pediatrist and an endocrinologist were divided into three (03) puberty classes according to classification of Tanner (1976) [12]. Studied variables the evaluated variables related to in first the blood lactate rate [La] related to the muscular suffering. In the second place, it was about the glycemia [Gl], of the magnesemy [Mg], of the total fatty acids [AGt], of triglycerides [TG], of total cholesterol [CT], of C-reactive protein [CRP]. The concentrations associated with these parameters were given front, with semi-course (3 months) and after the period of preparation (6 months). C-reactive protein had been retained to detect us a possible inflammatory state related to the state of drive of the judoists. In addition, the lactatemy was the subject of a follow-up for the period of recovery of t=0 s to t=10 min, while following the procedure of Margaria (1961), with savoir : t=0, t=1/2, t=11/2, t=2, t=3, t=4, t=41/2, t=5, t=51/2, t=6, t=7, t=8, t=9, t=10 minutes [13].

2.1. Experimental work: The experimental study was based on the statement of the caused variables. All the protocols rested on the recommendations enacted by the French Company of Medicine of the Sport on the physical capacity (1992) [14].

2.1.1. Equipment used: Infra-red spectrophotometry with transform of Fourier (IRTF) was used to analyze qualitatively, quantitatively and especially in a total way several biochemical compounds at the same time [15]. This new technique allowed in the study of Boussaïdi (2008) to determine the concentrations of 5 molecules implied in the glucidic, lipidic and proteinic metabolisms (total glucose, lactate, fatty acids, triglycerides, total cholesterol) and of C-reactive protein (CRP) associated the inflammatory processes [16]. All these biochemical analyses were carried out at the biological analysis laboratory of the Medical Center of Oil Company TOTAL-EP CONGO (ex ELF-CONGO), alone medical structure Congolese having a spectrophotometer IRTF. The blood capillary microsamples were taken at the moments previously quoted.

2.1.2. Blood microsamples and conditioning: The capillary microsamples were carried out by means of geloses tubes with the pulp of a finger of the hand (index or major) beforehand disinfected. The sample thus taken was immediately centrifuged during 3 minutes with 15.000 tours/minute (Heittch centrifugal machine, Germany) to separate the serum from the erythrocytes. The tubes were then placed in congelation while waiting for their sending for analysis with Pointe-Noire by spectrophotometer IRTF of the type IFS28 (Briker, Germany). The examination of the kinetics post-exercise of the blood lactate concentrations made recourse to the model of Strasbourg of evolution of the lactatemy post-exercise. This model of Strasbourg answers the formula [17]:

$$\mathbf{L(t) = L(0) + a_1 (1 - e^{\gamma_1 t}) + a_2 (1 - e^{\gamma_2 t})} \quad (1)$$

Moreover, the coefficient ã related to disappearance or the muscular production of lactate was given according to the mathematical method of adjustment biexponentiel by iterations. For this purpose, the number of 15 blood taking away (found in our work) proves to be necessary to calculate γ_1 (production muscular of lactate) and γ_2, according to the study of Oyono-Enguelle and al. (1993) [17]. Indeed, one cannot reduce to less than 15 points the number of taking away to

appreciate with γ_1 reliability and γ_2, $\tilde{a}_1$ lending oneself badly to such a reduction by using this mathematical process. However, for γ_2 only two items (4 and 10 min) can be enough to determine it using the empirique equation:

$$\gamma_2 = 0{,}0724+0{,}755\{[La](4)-[La](10)\}/[La](4).\Delta t-0{,}00684\ [La](10) \quad (2)$$

In accordance with the results of Baron and al., (2006) [18]. The program of drive comprised 192 training sessions divided into 2 meetings per day and this during 4 days per week. Four phases characterized each meeting with savoir: a physical preparation, a drive technico-tactic, a return to a state of calm and debriefing. Three types of drive, specific to the judo, were used: tandoku-renshyu (training as a recluse) with fall. The judoists carried out and repeated attacks simulated, by imagining the position of his adversary, sotai-renshyu (training free without resistance of the partner, with entries in various directions, accompanied by the falls) and sotai-renshyu avec obstacles for the entries.

2.2. Statistical analysis: The data obtained were treated using the software of statistics Scientific Word and Mathcard, version 9.2. With regard to the analysis of the results, the statistical methods descriptive and inferential were used. Being the descriptive statistics, it was summarized with the calculation of the indices of central tendency and dispersion. As for the statistical methods inferential, the nonparametric test U of Mann-Whitney for the comparison of two averages and the variance analysis (ANOVA), with a way and 3 factors for the comparison of more than 2 average (3 moments of evaluation) followed test a posteriori of Bonferonni-Dun were employed. The statistical threshold of significance of all the tests was fixed at $p<0.05$.

2.3. Operational definitions: The judo, disciplines Olympic, is an activity physical and sporting of gripping having for goal of an adversary will fight according to a codified whole of techniques of projection, of seizure on the ground, strangulations and keys' of arm [1]. A judoist junior is defined as a judoist whose age varies between 15 and 17 years [19]. The drive in strength-velocity is retained like a sporting drive carried out with a supra-maximum intensity (higher than 80% of the aerobic maximum power, LDC), leading quickly to physical exhaustion [20]. A subject was considered normoglycemic if its rate of glycemia lay between 3.3 and 5.1 mmol/l, that is to say 0.80 and 1.26 g/l. the biochemical values of the lactatemy were regarded as normal for varying lactate rates of 0.6 mmol/l with 1.8 mmol/l, the values of the magnesemy were considered usual if they lay between 0.65 and 1.05 mmol/l (16.0 – 25.5 mg/l or 1.60 – 2.55 mg/dl) [21].

2.4. Ethical considerations: This study obtained the agreement of the ethics committee of the Medical Company of Congo (SMC) and that of the Olympic National Committee and Sporting Congolese (CNOSC), while being based on the recommendations of Helsinki. In the event of discovered of a pathology contributing to a sporting against-performance, the judoist was referred to a doctor specialist for assumption of responsibility.

3. RESULTS:

The evolution of the serum concentrations recorded at the time of the first meeting of the program of drive is presented in table 1.

Table 1: Average values and standard deviations of the differences in blood concentrations (differences before meeting - after combat) at the time of the first meeting.

	Values reference	Before	After meeting fights	Δ (concent.)	p -value
[Gl](mmol/l)	3.8 – 5.1	4.05±0.90	5.11±1.82	0.05±1.52	0.037
[La](mmol/l)	0.8 – 1.8	0.99±0.15	9.98±2.27	9.01±1.04	0.01
[Mg](mmol/l)	0.65-1.05	0.74±0.92	0.67±0.13	-0.07±0.77	0.066
[TG](mmol/l)	0.6 – 18.0	1.04±0.18	1.16±0.19	0.12±0.01	0.071
[CT](mmol/l)	4.00-6.20	6.84±0.61	6.67±0.40	0.50±0.32	0.059
[AGt](mmol/l)	5.4 – 12.7	7.42±1.32	8.19±1.34	0.73±0.05	0.045
[CRP] (mg/l)	< 1	0.59±0.13	0.60±0.11	-0.01±0.02	0.103

Data expressed in the form of average ± standard deviation. Abbreviations: Δ, difference; [Gl], rate of blood glucose ; [La], plasmatic concentrations in lactates ; [Mg], magnesium blood concentrations; [TG], blood concentrations in triglycerides ; [CT], cholesterol level ; [AGt], concentrations in fatty acids ; [CRP], C-reactive protein.

At the end of the last combat (before the period of relieving), [La], [Gl] and [AGt] increased significantly compared to the beginning of the meeting, whereas CRP remained unchanged. Moreover, one non-significant increase in [TG] was observed ($p<0{,}071$), concomitantly with a fall also non-significant of [Mg] blood ($p<0{,}066$) and [CT] ($p<0{,}059$). With semi-course of the program (table 2), the significant variations were noted on the level of [La], of [TG] and of [Mg] blood.

Table 2: Average values and standard deviations of the differences of blood concentrations, rate of glucidic and lipidic oxidation (differences before - semi-course) to 95% of FCmax

	Values reference	Before	After meeting fights	Δ (concent.)	p -value
[Gl](mmol/l)	3.8 – 5.1	4.07±0.12	3.85±1.82	0.08±1.01	0.023
[La](mmol/l)	0.8 – 1.8	0.97±0.18	9.98±2.27	9.00±3.05	0.047
[Mg](mmol/l)	0.65-1.05	0.71±0.92	0.67±0.13	0.04±0.76	0.046
[TG](mmol/l)	0.6 – 18.0	1.02±0.20	1.16±0.19	0.14±0.21	0.031
[CT](mmol/l)	4.00-6.20	5.11±0.53	5.67±0.40	0.16±0.13	0.102
[AGt](mmol/l)	5.4 – 12.7	7.28±1.49	8.19±1.34	0.16±0.43	0.049
[CRP] (mg/l)	< 1	0.62±0.13	0.69±0.11	0.31±0.71	0.035

Data expressed in the form of average ± standard deviation. Abbreviations: Δ, difference; [Gl], rate of blood glucose ; [La], plasmatic concentrations in lactates ; [Mg], magnesium blood concentrations; [TG], blood concentrations in triglycerides ; [CT], cholesterol level ; [AGt], concentrations in fatty acids ; [CRP], C-reactive protein.

The analysis of the concentrations revealed however that the increase was only effective that on the level of [Gl], of [TG] and of the [CRP]; as for [Gl], [Mg] blood, with [CT] and with [AGt], a fall was observed. In addition, the only significant difference found between the semi-course and the end of the program (table 3) related to only it [La]. At the end of the program of drive (table 4), all the serum concentrations were characterized either by a significant fall (case of [Gl], [La], [TG], [CT]), or by a significant rise for [CRP]; [Mg] the blood one remained quasi-constant. The examination of the total sample (n=14) objectified a significant decrease of the concentrations of [La].

Table 3: Average values and standard deviations of the differences in blood concentrations (differences semi-course - end programs) to 95% of FCmax.

	Values reference	Before	After meeting fights	Δ (concent.)	p -value
[Gl](mmol/l)	3.8 – 5.1	3.01±0.07	3.90±2.07	0.89±1.24	0.164
[La](mmol/l)	0.8 – 1.8	0.87±2.27	8.63±2.11	+2.69±1.84	0.022
[Mg](mmol/l)	0.65-1.05	0.67±0.13	0.39±0.52	+0.72±0.45	0.156
[TG](mmol/l)	0.6 – 18.0	1.16±0.19	1.01±0.25	+0.10±0.23	0.190
[CT](mmol/l)	4.00-6.20	4.82±0.41	5.93±0.51	0.11±0.48	0.192
[AGt](mmol/l)	5.4 – 12.7	7.35±0.25	7.78±2.07	0.43±1.80	0.058
[CRP] (mg/l)	< 1	0.87±0.08	0.96±0.12	0.09±0.10	0.065

Data expressed in the form of average ± standard deviation. Abbreviations: Δ, difference; [Gl], rate of blood glucose ; [La], plasmatic concentrations in lactates ; [Mg], magnesium blood concentrations; [TG], blood concentrations in triglycerides ; [CT], cholesterol level ; [AGt], concentrations in fatty acids ; [CRP], C-reactive protein

Table 4: Average values and standard deviations of the differences in blood concentrations (differences before - semi-course – end programs) to 95% of FCmax.

	Values reference	Before	After meeting fights	Δ (concent.)	p –value
[Gl](mmol/l)	3.8 – 5.1	5.31±0.32	3.95±0.07	3.90±0.25	0.031
[La](mmol/l)	0.8 – 1.8	9.98±2.27	8.63±2.11	6.10±3.11	0.045
[Mg](mmol/l)	0.65-1.05	0.67±0.13	0.59±0.62	0.67±0.06	0.174
[TG](mmol/l)	0.6 – 18.0	1.16±0.19	1.01±0.15	0.94±0.13	0.042
[CT](mmol/l)	4.00-6.20	6.67±0.40	5.93±0.51	5.91±0.17	0.047
[AGt](mmol/l)	5.4 – 12.7	8.19±1.34	7.78±1.07	7.54±0.08	0.057
[CRP] (mg/l)	< 1	0.60±0.09	0.69±0.05	0.96±0.01	0.033

Data expressed in the form of average ± standard deviation. Abbreviations: Δ, difference; [Gl], rate of blood glucose ; [La], plasmatic concentrations in lactates ; [Mg], magnesium blood concentrations; [TG], blood concentrations in triglycerides ; [CT], cholesterol level total ; [AGt], concentrations in fatty acids ; [CRP], C-reactive protein.

Lastly, the analysis of the curves of evolution of [La] during recovery, after the last combat, highlighted a less marked exponential pace at the end of the program than at the beginning. Nevertheless, a clear reduction and more rapid of the plasmatic concentrations of [La] were observed at the end of the training cycle.

4. DISCUSSION:

The goal of this study was to evaluate the effect of a program of drive "strength-velocity" on the serum concentrations in the Congolese judoists old from 15 to 17 years of the national team in precompetitive period. The variations of the data of the blood concentrations show at the end of the program a significant fall of the glycemia (-36.1%), rate of triglycerides (-23.4%) and total cholesterol (-13.0%). On the other hand, one noted a significant rise of CRP (+60.0%), total fatty acids (+8.6%) and magnesemy (+6.8%). The speed of elimination of lactates, as for it, varied according to the category of weight of the subjects (faster at lightest and slower at the heavy ones). Lastly, the kinetics of recovery post-exercise of the blood data varied according to the moment of evaluation and the studied biochemical variable. This study of several variables calls several criticisms. The first limit is related to the absence of blood examinations to the presence or not of a state paludic at our suets. Indeed, the towns of Brazzaville and Point-Black are located in zones of paludic endemic, with respective frequencies of 78.8% and 81.5% [22]. Insofar as a consequence first of the malaria is

anaemia [23, 24] and where anaemia is likely to reduce the transport of oxygen [24], it are probable that a chronic malaria can reduce the aerobic performance. Our subjects can thus be feeble when they are affected by the malaria. Moreover, the study of Bongbele and al., (1998) [25] on the blood transport capacity in Congolese sportsmen high level, apparently healthy, raises that this anaemia is haemolytic by nature [26], but can be also ferriprive.

Moreover, Schmidt and al., showed that the blood capacity of transport of O_2 depends, inter alia, of the infested percentage of erythrocytes [24]. Moreover, so some of our subjects could be not infested, it is possible that those suffered from other parasitoses or of deficiencies has minimum, being able to explain an anaemia. It is also probable that they were also affected by the malaria, but in sufficiently tiny proportions to make a drop thick wrongfully negative [27]. However, several studies showed that the reduction of the rate of haemoglobin induced by the metabolic disturbances caused by the malaria causes limitation of the maximum consumption of oxygen, by the means of a fall of the affinity of haemoglobin [28]. It would be then suitable to determine the total number of erythrocytes, the concentration of haemoglobin, average erythrocytaire volume, the hematocrite and the blood capacity of transport of oxygen. The second limit is related to the generalization of the results to the whole of the judoists of Congo. Indeed, the power of a statistical test being related to the sample size, the data obtained from our 14 judoists do not make it possible to draw the generalizable conclusions to the young Congolese judoists. However, the principal forces of this work hold in several points.

First of all, no study, to our knowledge, brings back in sub-Saharan Africa (ASS) results associated with the effects of a drive in "strength-velocity" on the biochemical modifications in high level black judoists involved in full growth. Such is the first force of the study. The second force resides in the use in ASS of spectroscopy IRTF to evaluate the immediately induced biological modifications by this type of drive. Indeed, alternation at the time of the combat of judo of very short actions (2 to 4 seconds), very intense (infra-maximum), proceeding during reduced spaces (tatamis of 16m x 16m) and time of active recovery of variable durations (distributed according to the drawings of lots), characterizes the current practice of the competitions of judo. If in the plan physiological and more particularly energy, the interaction of these alternations were the subject of some studies [29, 30], it is on the other hand seldom the case of the variations of the blood data immediately induced by this drive. Except the directly measurable variations of the lactatemy in the course of competition and drive, we miss sufficient and reliable information in this field. This deficiency probably results from the absence of tools and techniques adapted and directly usable on the ground. This explains the choice of spectrometry IRTF to mitigate the lacks relating to it. In spectrophotometry close to the infra-red, this technique was recently used in a noninvasive way in sport for, starting from haemoglobin, to study muscular oxygenation [16]. This work brings back differences in concentration of glucose by the means of a significant increase during engagements in our judoists, whatever 0the period of evaluation. Already Klassen and al., (1990) had observed from the very start of the combat of judo, a free passage of glucose coming partly from the catabolism of muscular glycogen [31]. This very transitory phenomenon can however explain only partially the significant increase of the glycemia observed, especially at the beginning of the program (Δ = 26.1% of the value before the fight). It is probable that this one is primarily due to a strong hepatic reactivity under the effect of catecholamines, in connection with the intensity of work. The variation of definitely high glycemic concentration at the beginning of the program could result from a stronger hepatic, in particular muscular production and would testify indirectly to the use of the emergency substrates which are the ATP-phosphorylcréatine couple (PCr) and the muscular glycogen [32]. On the other hand, the reduction in the concentration in serum glucose between the program and the end of the program could be the sign of a depletion of muscular the glycogen reserves, synonymous with a beginning of tiredness and/or a food insufficiency in glucides. The recovery of [Gl], as for it, is made conspicuous by a decrease with the waning of the combat, however faster at the end of the program (-29.5%) that at the beginning of drive (-26.2%) and with semi-course of the training cycle (-5.4%). The strong reduction observed during phases 3 and 1 of the program indicates a strong peripheral collecting, in particular muscular that its hepatic production, probably resulting from a significant activation, especially from the GLUT-4 supported at the same time by a weak muscular concentration and the presence of the insulin [33], itself allowed at the end of the program by the fall of the intensity of the muscular activity. Compared to the variations of the concentrations out of triglycerides and total fatty acids (tables 1 and 3), they show the same kinetics curiously as those of the glucose : (1) mobilization of [TG] and [AGt)], during phases 1 and 2 of drive, with respective variations of : +11.5% versus +9.9% for [TG], +12.5% *versus* +9.0% for [AGt] ; (2) inversion of the phenomenon during periods 2 and 3 : -14.8% for [TG] and -2.0% for [AGt].

This study made it possible to measure the lactatemy in four situations. Firstly, at rest and at comparable age, [La] with 0.99±0.15 mmol/l in our judoists 1.03±0.40 mmol/l in the series of Saïgo amounts against, (2004) [34]. After heating, the values of [La] of our subjects are respectively of 9.11±1.82 mmol/l before the first combat (beginning of the program, 9.27±0.12 mmol/l with semi-course and 9.16±0.07 mmol/l at the end of the program, is an average of 9.51 mmol/l. Ba and al., (2012) bring back a lactatemy of 2.33±0.38 mmol/l in young old Senegalese judoists from 14 to 17 years [35]. On the other hand, Victorov and al. (2002) bring back 4.7±2.2 mmol/l at the practise of sambo (discipline derived from the ju-jitsu, where the keys of neck and leg are allowed) [36]. These results show a disparity of the lactatemy according to whether the activities solicit more the upper limbs or the lower limbs. Indeed, the meetings of physical preparation differ from the muscular groups which they bring into play. Concerning our program of judo, the

heating was summarized with the following exercises : race, sprint and stretching (10 minutes) ; swim waza-uchi komi, exercises and randori (10 - 15 minutes) ; tachiwaza- uchi komi, catches, projections and exercises of statics (10 - 20 minutes). This protocol approaches that adopted in sambo. [La] of our judoists was evaluated at the end of the PP to an intensity lower than the rate/rhythm noted after the engagements. The evolution of [La] thus testifies to the intensity of work submaximal of the exercises used. On the other hand, with recovery (end of course), the lactatemy decreases significantly of the beginning of the program at the end of the program according to exponential forms' varied with the beginning of the program with semi-course and at the end of the course (figure1).

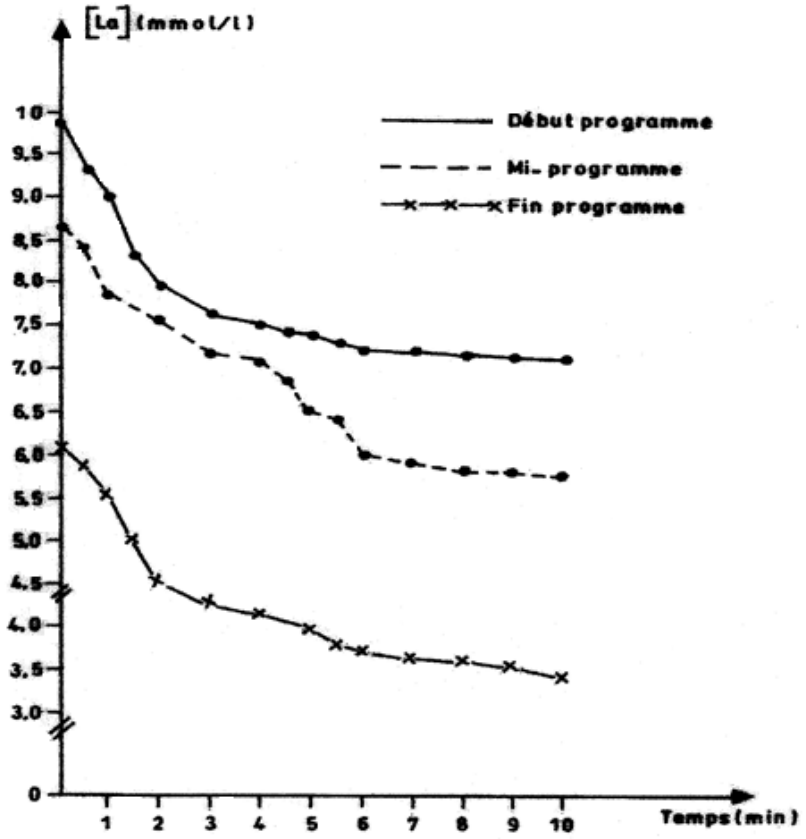
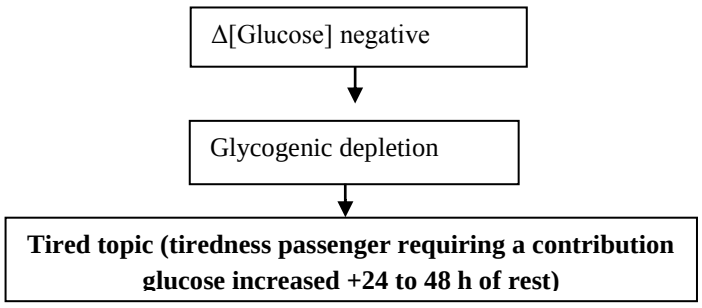


Figure 1: Kinetic of the post - fight lactatemia in beginning of the program, to mid - course and in end of program.

Moreover, the speed of elimination of lactates depends on the category of weight (table 5). Recovery proves faster at the light ones (73 kg) because the retreat of tiredness is pronounced more at those. To this end, there exists little of data relating to measurements of the lactatemy post-exercise during the judo. Only Tezuka and al., (2008) were interested in this parameter according to the category of weight in the judoists of the national team of Japan, but by focusing measurements only on the seniors [37]. Our study is thus the first to present a complete measurement of the lactatemies post-exercise on the judoists in the course of growth. It thus makes it possible to have an indirect representation of the intensity and metabolic impact of tiredness at the time of the engagements. In the plan of the follow-up of the health of our young judoists throughout the drive "strength-velocity", the variations of the differences in concentration of CRP proved to be lower than 1. However, this does not allow a suspecter a rather frequent inflammatory state in the sportsman subjected to significant muscular, tendineuses, aponevrotic constraints either/and with traumatisms resulting from the repeated shocks (case of the falls on the carpet with the judo). Associated a brutal rise in sedimentation (VS), not studied in this work, "the reactivity" of CRP is an excellent indicator of an acute ignition of mechanical or viral origin which it is appropriate very quickly to eradicate before continuing or to take again the drive. It is for this reason that CRP was to appear in the longitudinal control of the training of our judoists. Moreover, Duclos. (2008) retain this variable like contributes to the diagnosis, inter alia biological parameters measured during a physical activity standardized, on the form of "trees decisional" illustrated by figure 2 [38].



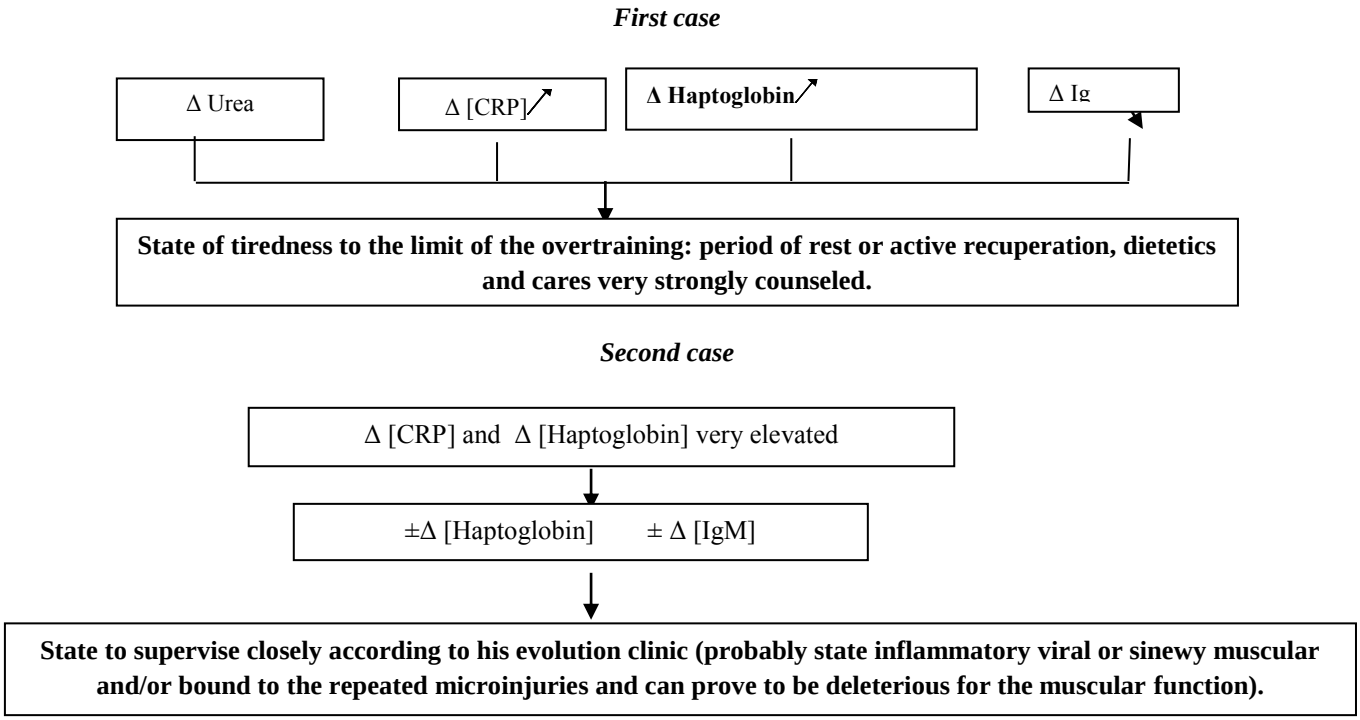


Figure 2: "Trees decisional" proposed by Duclos to facilitate the orientation of the diagnosis. Excerpt of Duclos (2008) [38].

Lastly, in what milked with the diagnosis of the magnesium statute, one notes a significant disturbance of the magnesemy, going in the direction of a reduction. Thus, one records variations of -10.4% in the first phase of the program of drive, -6.0% in the phase 2 (semi-course) and 13.5% at the end of the program. These losses are ascribable with sweat. Indeed, Mg perdition being related to the sweat rate. This sweat escape of Mg, consecutive with training sessions of duration equalizes at 3 hours in our study, results in to decrease the magnesemy and to limit the urinary excretion of it. It thus proves significant to supplement our Mg subjects, even if its biodisponibility still causes many interrogations. It is then necessary to support the consumption of following Congolese food, rich in Mg: peanuts, the leguminous plants (beans in particular), fruit and vegetables (cooked spinaches, cooked potato, lawyer and banana), shrimps (cooked and peeled), ….

5. CONCLUSION

This study made it possible to confirm the existence of the modifications of the serum concentrations in the judoists juniors subjected to an intensive drive by strength-velocity type. The values of CRP and the lactatemy, with the effort and during recovery, suggest that there are limits with the practice of the high level judo in the Congolese child old of 15-17 years. The adoption of such a strategy of drive requires nevertheless the implementation of broader studies, including a greater number of children and fascinating of account as well the profile haemoglobinic as the nutritional statute.

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