

Periodization of the training load through a preparatory season for high-level Algerian Judokas.

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ARTICLE INFORMATION

Original Research Paper

Received: 14/01/2021

Accepted: 29/04/2021

Published: 01/06/2021

Keywords:

Judo,
Planning,
Preparation,
Training load

Abstract

The objective of the study is to propose an operational approach for methodological expertise of the preparatory programs of Algerian competitive judo teams. To this end, the cost dynamics of each of the preparatory periods for an annual "Model" program (2010/2011) in the "Senior Boys" category of the GSP club were scrutinized. A specific conventional scale was used. We conclude from this: A design adapted to the constraints of the official competitive calendar, a schedule respecting the main methodological rules of the application of loads to training. Some conceptual sprains without major impact on the methodological validity of handling loads during training.

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I. Introduction

More than the practical conduct of sports training, its preliminary design in the context of judicious planning is a condition for its success. The training planning being an arrangement and a connection of all its structuring phases, its goal is to achieve an optimal preparation at the end of a determined cycle (session, microcycle, meso-cycle, stage, period, macrocycle). According to Cazorla (2005), the programming of training contents is the operation which, within the framework of a predefined planning, aims to obtain the development of the capacities required by the targeted performance.

A complete preparatory cycle (Macrocycle of training) is composed according to Matveev (1983) of three distinct periods (Figure 1). The so-called "Preparatory" period with its two "General" and "Special" stages (or phases) is supposed to encompass most of the land work. At this stage, the objective is to acquire the general and specific prerequisites necessary for the construction of the appropriate sports form for the achievement of the competitive objective foreseen for the current macrocycle. The "competitive" period brings the final adjustments to optimize and stabilize gains. The transitional period, it intervenes to ensure a certain marked break with the basic work of the two preceding periods (Preparatory and Competitive) and to let operate the physical and psychological recovery processes leading to the preparatory renewal of the following macrocycle.

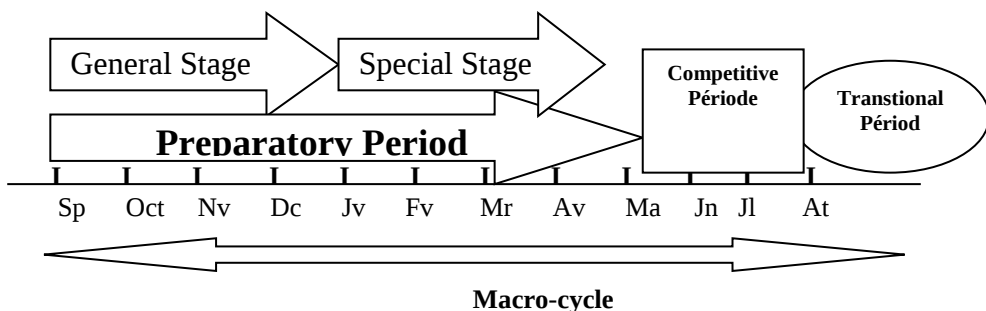


Figure 1. Sportive Training Periodization

Bourne and Vivier, (2016), note that the adjustment of the competitive program and the control of the results by progressive improvements of the performances over time have become essential to be able to reach the top of

the form during the big competitions. Also and according to Morin and al (2014), the definition of an individual capacity for overall adaptation to training to determine thresholds and optimal load distribution strategies, would make it possible to avoid overwork, overtraining and injury. Aboura, and Tahri (2020) believe that the use of "plyometric" exercises in judo must be conditioned by appropriate programming.

Like other sports, the reality of the quality of the training of Algerian Judo with reference to what is recommended by Zerzouri (2006), poses many problems of an infrastructural, material and organizational nature, but also of its methodological conduct. This last consideration seems to be fundamentally linked to the skill level of the coach and his practical experience. However, the organization of the competitive seasonal calendar as defined by the Algerian judo sports authorities (Leagues and Federation) is often a major constraint. This remains difficult to counter with a preparatory design, however judicious it may be.

In spite of this, it still seemed interesting to us to look at the question of the design of the training provided to competitive Algerian judokas aiming for high results and to study the specificities of its different periods and preparatory stages. This will not only situate it in terms of respect for the methodological principles governing the conduct of training in general, but above all to identify the dynamics of the load that characterizes it in the organizational context mentioned above.

In Algeria, the work of Meftah and Merichiche (2012) has clearly demonstrated the awareness of coaches regarding the need and importance of planning training in its short, medium and long dimensions. Bouhadj and Allili (2018) have also shown the role of planning in sport training and its scientific importance for the management of handball training. In their study on the analysis of the load during the pre-season physical preparation period among footballers, Chebah and Benlabed (2018) conclude on the importance of planning in the quantitative and qualitative orientation of loads according to of the various preparatory phases.

The training load is defined in the specialized literature as the use of work potential until the onset of fatigue. It is also said that it has the effect of stimulating the recovery processes of energy resources and therefore not only allows their restoration but also an "overcompensation" of the working capacity of the body. According to Gazzano (2002), quantifying the training and competition load would now be an integral part of any rigorous sports training. Bounemri-Zaki (2009) affirms in conclusion of his work that

knowing the physical and morpho-functional characteristics of young categories of athletes is essential before proceeding to the planning of the training load which must be done in a rational way.

The four components of the load which are the nature of the effort, its volume, its intensity, the duration and the type of the rest interval which enters it, constitute just as many levers of its modulation. The training in high level judo, aiming by its purpose the physical optimization to guarantee the maximization of the technical-tactical mastery in a combat situation must apprehend the dosage of the loads in the most careful and efficace way. Precisely, the planning of physical training in this discipline, aiming at the realization of this finality, has the role of mixing judiciously and without omission the development of a whole set of so-called specific. Motor explosiveness, endurance of strength, motor responsiveness, range of movement and speed in energy supply and recovery guarantee the construction of the appropriate physical condition in this sport. For Paillard (2010), the ideal physiological profile of the judoka is characterized by an important VO2Max, a high muscular power and an efficient lactic metabolism. Closely correlated with this "physical construction", a whole technical-tactical arsenal with volume, variability and proven motor efficiency must be firmly anchored. All this work must be carried out in strict accordance with the terms and principles governing the process of building an integral sporting form, the methodological direction of which is dictated by the delicate task of handling and programming loads.

What would the dynamic configuration of this load modulation look like through a full preparatory season for competitive Algerian judo training ? What would be the structural specificities of the load of each of its major cycles ? These are the two main questions to which this analysis will try to answer.

In view of the convincing and constant results of the GSP-Judo team, we expect a general methodological validity of the study case (the model program proposed to the expertise) that we have undertaken to analyze by this study.

We also believe that a certain gap between the theoretical basis and the reality on the ground concerning the preliminary design work of the preparatory programs would be inevitable. This would necessarily be the direct consequence of the various factors mentioned above.

The present study, while attempting to verify the hypothesis of the overall methodological validity of the distribution of the loads, it will attempt to identify and assess the extent of any deviations in order to properly evaluate their effects on the preparatory profitability in its entirety.

For this we undertook to study the dynamic profile of the load applied for each period of one of the full model preparatory programs of an Algerian judo team having dominated the competition over several sporting seasons. The aim was to assess their quantitative indicators and identify the qualitative specifics that characterize them as "successful" programs.

It will in fact be a methodological expertise examining the relevance and overall consistency of the choice of microcycles (short cycles) retained within the framework of mesocycles (medium cycles) comprising each of the three conventional preparatory periods (See figure 1). The specificities of the load dynamics of each of the stages relating to the three preparatory periods of this program will be studied on the basis of the load values of each of the microcycles composing them. These values necessarily reflect the typology of each of these microcycles.

As a research goal and more than a technical-scientific judgment to be made on a design work in training planning, our main aim here is to offer a methodological approach to the expertise of preparatory programs handling considerable loads in Judo.

Note that this purpose has always been one of the missing tools for the needs of operational monitoring of the work of the institutions responsible for the preparation of high-level teams and more particularly the Algerian national sports elites.

The optimization of the competitive objectives to aim for, the distribution of the time available over the preparatory periods, the judicious choice of the typology of average cycles and short cycles and finally the adequate configuration of the loads for each session, these are the indicators constituting the very essence of the task of planning high performance training which national Judo and elite sport in general need to be offered an objective evaluation approach.

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II. METHODOLOGY

The load dynamics of the different stages of each of the preparatory periods for an annual "Model" program were scrutinized for the purposes of this study. This program for the 2010/2011 sports season relates to the "Senior Boys" category of the Algiers « Groupement Sportif des Pétroliers (GSP) » judo club. The said sporting season (2010/2011) is retained as being a model season among the many successful seasons of this club because of the individual and collective results recorded.

A conventional scale (Table 1) was used to quantify the value of the charges for each microcycle retained in each of said preparatory steps.

Table 1. Conventional scale for the quantification of the training load of the different types of Microcycles used

N°	Type of Microcycle	Abbreviations used	Conventional Value
1	Microcycle of Ordinary Général Training	M.O.G.T	2
2	Microcycle of Ordinary Special Training	M.O.SP.T	3
3	Microcycle of Shock Général Training	M.S.GL.T	3
4	Microcycle of Shock Special Training	M.S.SP.T	4
5	Microcycle of Introduction	M.I	2
6	Microcycle of Competition	M.C	4
7	Microcycle of Recovery	M.R	2

The data are gathered in two general matrices (Tables 3 and Table 4) showing the conventional values of the loads for each of the stages of the three preparatory periods of the "typical" sports season studied.

In order to determine the dynamics of the loads between the different cycles compared we used the statistical index of coefficient of variation (C.V) expressed as a percentage (%).

To stay in the objectives of the study, the team of Judo and the program "Model" on which our choice has come to conduct this analysis have been targeted because of a number of characteristics (Table 2).

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Table 2. General characteristics of the population of (Judokas) subject to the Training program studied.

N	Characteristic	Value
1	Club	Groupe Sportif des Pétroliers(GSP)
2	Age Category	Juniors/Séniors (Boys)
3	Age Range	18 -32 Years
4	Average Number	30 Athletes
5	Average Number of International Athletes	12 Athletes
6	Best Individual Performance	Several African Titles
7	Best collective Performance	Arab Champion of Champions Clubs
8	Start Date of the Preparatory Season	End of August / Beginning of September
9	End date of Preparatory Season	July 31
10	Number of Weeks of Training / Year	48 weeks
11	Number of Weekly Sessions	5-6 sessions
12	Average Session Duration	02h00
13	Average Number of Competitions in Year	06 Competitions
14	Number of Coaches	02 (01principal + 01 Assistant)

III. RESULTS

Table 3. Load values of the first Macrocycle of the 2010/11 sports season of GSP Judo BoysTeam

Microcycle	Prepaatory. P (G-ral Stage)	Prepaatory. P (S-cial Stage)	Competitive. P	Transitional..P	Total	Conventional Value	Total
M.O.GL.T	3	0	0	1	4	2	8
M.S.GL.T	1	0	0	0	1	3	3
M.O.SP.T	0	2	2	0	4	3	12
M.S.SP.T	0	2	0	0	2	4	8
M.I	0	0	0	0	0	2	0
M.R	2	3	2	1	8	2	16
M.C	0	0	2	0	2	3	6
Total	6	7	6	2	21		53

Legend: M: Microcycle, O : Ordinary, S: Shock, T: Training, GL: General, SP: Special, I: Introduction, R: Recovery, C: Competition.

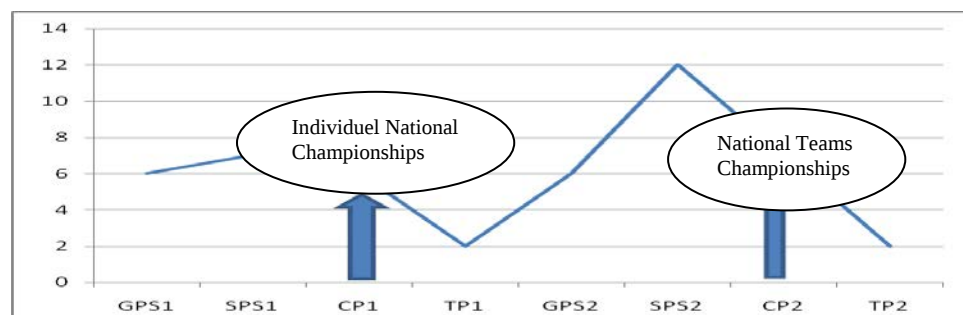
**Table 4. Load values of the second Macrocycle of the 2010/11 sports season
Of GSP Judo Boys Team.**

Microcycle	Prepaatory. P (G-ral Stage)	Prepaatory. P (S-cial Stage)	Competitive. P	Transitional..P	Total	Conventional Value	Total
M.O.G.T	2	0	1	0	3	2	6
M.S.GL.T	1	0	0	0	1	3	3
M.O.SP.T	0	3	1	0	4	3	12
M.S.SP.T	0	3	0	0	3	4	12
M.I	0	0	0	0	0	2	0
M.R	3	6	3	2	14	2	28
M.C	0	0	2	0	2	3	6
Total	6	12	7	2	27		67

Legend: M: Microcycle, O : Ordinary, S: Shock, T: Training, GL: General, SP: Special, I: Introduction, R: Recovery, C: Competition.

**Table 5. Summary of the load values of the two macrocycles of the 2010/11
Sports season of the GSP / Judo / Boys team**

	Prepaatory. P (G-ral Stage)	Prepaatory. P (S-cial Stage)	Competitive. P	Transitional..P	Total
Macrocycle 1	6	7	6	2	21
Macrocycle 2	6	12	7	2	27



Legend/ GPS : General Preparatory Stage, SPS : Special Preparatory Stage, CP : Competitive Period, TP : Transational Périod

**Figure 2. Load dynamics (in conventional value) of the 2010/11 sports
season of GSP Judo Boys Team.**

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Table 6. Annual load dynamics (Inter Macrocycles comparative study)

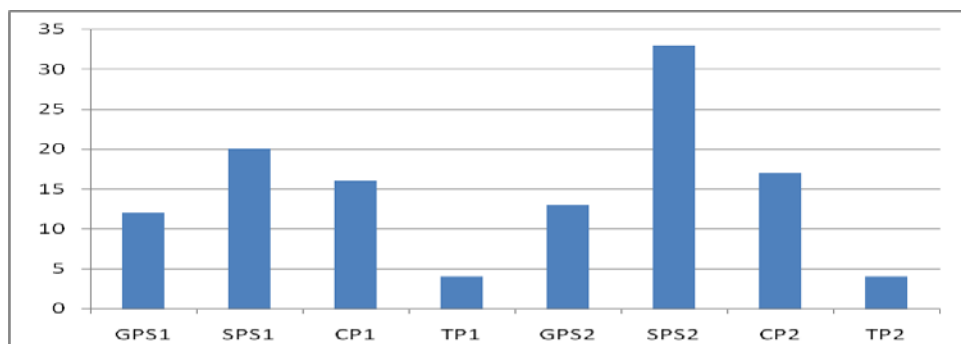
	Prepaatory. P (G-ral Stage) (GPS)		Prepaatory. P (Spécial Stage) (SPS)		Competitive Period (CP)		Transitional. Period (TP)		Total (Nber Mcc)	Total Load Value
	Nber	Val	Nber	Val	Nber	Val	Nber	Val		
Macrocycle 1	6	13	7	20	6	16	2	4	21	53
Macrocycle 2	6	13	12	33	7	17	2	4	37	67
	+0	+0	+5	+13	+1	+1	+0	+0	+16	+14
Coefficient of Variation	0%	0%	71%	65%	17%	6%	0%	0%	76%	26.4%

Table 7. Values and percentages of inter-period growth of load under the 1st Macrocycle.

	Général Prep Stage		Special Prep Stage		Competitive period		Transitional Period		Total Nber	Total Value
	Nber	Val	Nber	Val	Nber	Val	Nber	Val		
Macrocycle 1	6	13	7	20	6	16	2	4	21	52
				+54%		-20%		-75%		

Table 8. Values and percentages of inter-period growth of load under the 2nd Macrocycle.

	Général Prep Stage		Special Prep Stage		Competitive period		Transitional Period		Total Nber	Total Value
	Nber	Val	Nber	Val	Nber	Val	Nber	Val		
Macrocycle 2	6	13	12	33	7	17	2	4	21	67
				154%		-48%		-76%		



Legend/ GPS : General Preparatory Stage, SPS : Special Preparatory Stage, CP : Competitive Period, TP : Transational Périod

Figure 3: Inter-period load dynamics of the two macrocycles of the sports season

IV. DISCUSSION

General annual program configuration:

Because of the programming of two distinct main competitive objectives (Individual National Championships and National Team Championships) separated by a time interval of more than 05 months (Figure 2), the "Double periodization" adopted for this said season by the coaches is considered entirely appropriate and goes in the direction of the "planning" modeling adapted to judo by Mahdad (2011).

In fact two (02) macrocycles of five (05) months and seven (07) months respectively were identified. Figure 2 clearly shows two peaks of load values, one in January 2011, the other in June 2011.

The difference recorded between the overall load values (15 points in favor of the second macrocycle (in Table 6) is understandable given the need to preserve the working capacities for a second competitive objective no less important and intervening much later in the season. This leaves more time for the deployment of a longer preparatory period.

- Regarding the General Preparatory Stage:

The comparison of the data relating to the General Preparatory Stage (GPS) of the two Macrocycles are identical (Coefficient of variation $V = 0\%$) in terms of volume (Number of microcycles) and Total Load Value (TLV).

If the duration of the EPG of the second macrocycle seems reduced relative to the total duration of the preparatory period, this could be explained by the need for optimization, taking into account the level of development of general physical and technical capacities already well advanced in the end

of the 1st Macrocycle. This goes in the direction of an optimization approach qualified by "regulation of training" recommended by Krantz & Dartnell in 2008 and reported by Xavier Roy (2020). It is also with this aim of optimizing training that the so-called IPP (Integrated Physical Preparation) approach is recommended by Ghoula and Bengoua (2015) for the training of young footballers.

- Regarding the Special Preparatory Stage:

The Special Preparatory Step (SPS) of the second macrocycle shows a much greater difference in terms of the number of microcycles (CV = 71%) and the load value (CV = 65%) compared to the first macrocycle for obvious reasons of time availability, mostly.

- Regarding the Competitive Period:

A not very noticeable growth in terms of number of microcycles (CV = 17%) and load value (CV = 6%) in favor of this period falling under the second macrocycle was noted and which we attribute to the presence of a competitive objective generally considered secondary (Algeria Cup).

- Regarding the Competitive Period:

No significant difference can be noted for this period (CV = 0%), in its active phase. However, a second phase of two (02) to five (05) weeks qualifying as "passive" (without any chargeable load value) and immediately following this first phase is to be deplored because marked by a total break with the functional activity.

Semi-annual dynamic of the load (Intra Macrocylic study)

1. First Maco-Cycle :

1.1 General Preparatory Stage (GPS) - Special Preparatory Stage (SPS)

A 54% increase in the load value was noted in favor of the Special Preparatory Step (Table 7). This seems very admissible because of the necessary introduction to specific land work and with loads high enough to stimulate and achieve a growth in the physical, technical, tactical and even psychological indicators of the sport form targeted at the end of this Stage. That said, it is nevertheless essential to have ensured the basic functional conditions during the general preparatory stage as demonstrated by way of example by El Raoui (2004) in order to be able to assume this notorious increase in the load in the specific preparatory stage.

1.2 Special Preparatory Stage (SPS) - Competitive Preparatory Period (CPP)

A considerable drop of 20% was recorded when moving from the Special Preparatory Stage to the Competitive Period (Table 7). This is precisely recommended to guarantee the stabilization of the achievements of special physical preparation and especially to free up time for more tactical work generally more focused on the study of strategies and motor behavioral adjustment (technico-tactical) according to the various competitive situations. This work is usually less intensive. It is probably for this reason that Mokkedes et al. (2018) in their work on Plyometrics, recommend avoiding accentuating work with this exercise regime in competitive periods.

1.3 Competitive Preparatory Period (PC) – Transitional Period (PT)

As one would expect, a sharp drop in the value of the charges takes place immediately upon exiting the competitive period (PC). This decrease (75%) rightly marks a functional and psychological break in the body vis-à-vis the stress of the load in order to promote the renewal of its availability for work during the following cycle (Table 7, Figure 2).

2. Second Macro-cycle :

2.1 General Preparatory Stage (GPS) - Special Preparatory Stage (SPS)

A growth of over 150% of the load value has been raised in favor of the Special Preparatory Stage (Table 8). Growth of such magnitude could be explained more by the availability of time allotted due to the distance from the second competitive objective, than by an excess of importance of the second objective.

2.2 Special Preparatory Stage (SPS) - Competitive Preparatory Period (CPP)

The net decrease of 48% in load value (Table 8) was predictable due to the considerable duration of the specific preparatory period covered by this second cycle.

2.3 Competitive Preparatory Period (PC) - Transitional Period (PT)

Like the transitional period under the first cycle, the net decrease in load value (76%) comes to mark a real functional and psychological breakdown of the body in order to promote adequate recovery with some potential capitalization overall for the next major cycle (Table 8).

V. Conclusions

From the study of the load dynamics of the proposed program, we retain the following conclusions:

periodization of the training load through a preparatory season for high-level Algerian Judokas.

- A design adapted to the constraints of the reality of the official competitive calendar, with in this case a necessary “double periodization” (two distinct macrocycles).
 - A design respecting the main methodological rules governing the application of loads and the conduct of the process of building sports form as established by Grosser et al in 1989 cited by Wieneck (1997) and recalled by Franck (2016). We retain in particular those relating to the progressiveness, specificity, continuity and periodization of workloads, work-rest alternation and the optimal relationship between general and special work.
 - We deplore a transitional period (summer) too long but which would be justified by climatic and organizational considerations often imperative.
 - We also note the non-use of the MI-type Microcycle (Microcycle of Introduction) supposed to immediately precede the main competition and introduce it into its load characteristics and running conditions (Table 3).
- Consequently, we are allowed to conclude the confirmation of our general working hypothesis made in the introduction and according to which we predicted the overall methodological validity of the appraised program. We also confirm a certain (relatively minimal) gap between the general theoretical rules and the conceptual adaptations made to this program.

For greater reliability of the conventional table proposed and used in the context of this work and relating to the quantification of the training load of the different types of Microcycles recognized in the specialized literature, it would be wise and interesting to check the proposed values, through the “RPE-session” (Rating of perceived exertion) method used in the context of Boubekeur's work (2017).

The general approach that we propose in this contribution remains capable of being used as a methodological tool for expertise and program assessment not only in Judo but also in high-level sports training in general.

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