



MONITORING AND ANALYSIS OF TRAINING LOAD OF 12-13 YEAR-OLD MALE GYMNASTS FOR A ONE-YEAR TRAINING PERIOD

G. Sergiev*

Department of Gymnastics, Faculty of Public Health, Health Care and Tourism,
NSA "Vassil Iecski", Sofia, Bulgaria

ABSTRACT

Modern gymnastics is characterized with complex coordination routines and the exercises are performed with risk, originality, virtuosity, and safety of the execution. All these suppose a high efficiency and rationality of the educational-training process. The management of the training load during the different periods of preparation is at the basis of this process. The issue about the training load is fundamental in the theory and methods of sports training. It is always topical and provokes serious discussions. **AIM:** The aim of this study was to register, trace, and analyse the specific indexes of training load of 12-13-year-old artistic gymnasts. **METHODS:** The research methods we used included: registration, analysis, comparison, variation analysis. **RESULTS:** The obtained results about the training load would enrich the theory in a practical aspect and help specialists and coaches in the preparation of their athletes. **CONCLUSIONS.** The conclusions drawn based on the research showed that athletes' preparation was carried out in accordance with the major principles of sports training. In the future, some of the indexes could be changed which would add to the optimization of the preparation. A possibility for further analyses and discussions among specialists is provided.

Key words: artistic gymnastics, volume, intensity, coefficient of efficiency

INTRODUCTION

The successful management of the training process supposes high efficiency and rationality. Planning the training load during the different periods of preparation is in the basis of this process (1, 2) and it is different for the different age groups (3, 4). The issue about the training load is fundamental in the theory and methods of sports training (5). It is always topical and provokes serious discussions among specialists. The nature of the training load could be different regarding its characteristics – volume, intensity (6), and last but not least direction of the load which can be physical,

psychological, etc. According to Hadjiev (2011) the training load is a program for impact on the body of athletes in the period of many years of training. (7). That is why planning of the training load is a compulsory and indispensable component of specialists' work. According to Monèm Jemni and William A.Sands (2011) (8) „Long-term planning facilitates the achievement of the objectives via a structured periodization...“. Platonov (1988), cited by Hadjiev (9), claimed that in this way conditioning was gradually built as “ability to form new functional system of an organism”, on whose basis sports shape was formed later on.

According to Smolevskii at all (2014) we must distinguish the pedagogical aspect of the load, expressed in the amount and complexity of the exercises, as well as from a biological point of

*Correspondence to: *Georgi Sergiev, Department of Gymnastics, Faculty of Public Health, Health Care and Tourism, NSA "Vassil Levski", Sofia 1700, "Acad. Stefan Mladenov 21, sergiev_nsa@abv.bg, +359893396426*

view - the difficult consideration of the functional state of the body of the athletes (10). That is why the 12-13-year-old boys' training generally starts getting more personalized due to the fact that due to the individual abilities of the gymnasts. According to Hadjiev (1978) (11) the term training load "is closely related to the terms endurance and fatigue". Training load has a main forming effect on the organs and functions of the organism due to the adaptation to various training loads. Hadjiev continues that the theory of adaptation views the training load as a dose and effect (7). The dose is characterized by the volume and intensity. The effect is viewed as the reaction of the functional systems of an organism as a result of training loads which is expressed in functional changes. The objective regularities when viewing sports shape allow us to conditionally divide gymnasts' preparation into periods with different duration, with various purposes, tasks, and contents. In fact, this is the very nature of the periodization of the training process. According to Monèm Jemni and William A. Sands „Periodization begins by developing an annual plan that is composed of one or more macrocycles that include a preparatory period, a competitive period and a transition period.“ (8). In artistic gymnasts' plans, the most important indexes are the volume, intensity, and coefficient of efficiency. The variation in the load helps gymnasts adapt better to the training loads in the training process. According to Verkhoshansky (1998) „training theory has placed a high premium on training variation due to the observation that unidimensional approaches to training do not appear to result in continued adaptations“ (12). The training load is also different during the different stages of preparation (13, 14). In this research we assumed that

$$I = \frac{\sum Elements}{\sum A + t} \tag{1}$$

The coefficient of efficiency (in %) was calculated with Formula (2), where in the nominator we put down the performed exercises (volume) in the

revealing the indexes of the training load of 12-13-year-old gymnasts would make the educational-training process more purposeful and rational in the aspect of its optimal planning, carrying out, and further reporting.

PURPOSE

The **aim** of the research was perfecting the educational-training process in artistic gymnastics through revealing the indexes of the training load of 12-13-year-old male gymnasts. The following **tasks** were set: to trace the indexes of training load of 12-13-year-old gymnasts during one annual cycle of preparation, to analyse the results, and make recommendations for the future work of the specialists working with this age group.

METHODS

In order to fulfill the aim and the tasks set, we applied the following methods: research of the literary sources, registration of data in real time, analysis and synthesis of the information, comparative analysis, variation analysis, mathematical methods.

The research was done among 6 male gymnasts aged 12-13 years. We researched the training load, volume, intensity, and coefficient of efficiency. The major research was done from 1/9/2014 to 12/7/2015. The number of exercises performed were recorded every day in specially designed training diaries. The index of Intensity (I) was calculated with Formula (1), where in the numerator we put down the total number of exercises performed (volume), and in the denominator – the sum of the number of the approaches (A /number/) and time (t / min/) for the certain training, stage, or period. The unit of measurement is exercises/min.

routines, and in the denominator – the total number of the exercises performed (volume) over the period.

$$Coefficient\ of\ efficiency\ (\%) = \frac{Number\ of\ elements\ executed\ in\ routines + number\ of\ vaults}{Number\ of\ all\ elements\ in\ training\ set} \times 100 \tag{2}$$

RESULTS AND DISCUSSION

The preparatory period encompassed the time from 1/9/2014 to 31/5/2015 and was divided into two stages: **General preparatory period** (1/9/2014 – 1/2/2015) – It included 5 mesocycles divided into 19 training micro cycles. The following general indexes of the training load were registered – 112 training days, 112 training sessions, and 21 recovery days. **Special preparatory stage** (2/2/2015 – 31/5/2015) – It included 4 mesocycles divided into 17 training micro cycles. Two 3-day long competitions were held during this stage and the preparation for them was carried out in 7th and 8th micro cycles, respectively.

Competitive period (1/6/2015 – 12/7/2015) – The nature of the training activities during the competitive period was related to the preparation for the competitions. The preparation during the competitive period was carried out in 1st mesocycle consisting of 6 micro cycles. There were 35 training days and 34 training sessions, i.e., one training session per day. During the competitive period there were 2 competitive days connected

with the State Championship held in 6th micro cycle.

In the transition period no training activity was carried out.

Table 1 shows the specific training indexes for the one-year period. The differences in the indexes of the load when we made a comparison between the two stages of the preparatory period were logical due to the specificity of the preparation during the two researched periods. The general preparatory period was characterized with a basic preparation and that is why the increase in volume (the number of exercises) was normal while the intensity was within low margins. The number of approaches was high because there were few exercises executed in one approach. The special preparatory period was especially directed towards the preparation for creating the routines which led (in our case) to insignificant decrease in the number of the executed exercises but at the same time to a significant decrease in the time for preparation. The execution of strings of exercisers and routines were the reason why the number of the approaches dropped.

Table 1. Specific indexes of training load

Indexes	General Preparatory Period	Special Preparatory Period	Competitive Period
Exercises (n)	25971(n)	22204 (n)	6453 (n)
Approaches (n)	8657 (n)	4806 (n)	1063 (n)
Average exercises per micro cycle (n)	1366(n)	1306(n)	1075 (n)
Average approaches per micro cycle (n)	455(n)	282(n)	177 (n)
Duration (t)	22800 min (380 hours)	14500 min (241 hours 40 min)	3900 min (65 hours)
Average duration of a micro cycle (t)	20 hours	13 hours 25 min	10 hours 50 min
Average intensity of the stage (exe/min)	0.82 exe/min	1.15 exe/min	1.3 exe/min
Routines (n)	-	667 (n)	367 (n)
Average routines per micro cycle (n)	-	39 (n)	61 (n)
Average coefficient of efficiency for micro cycle (%)		37.31 %	58 %

All these affected the intensity which gradually increased in this stage of preparation. The number of the exercises decreased during the competitive period – 177 per micro cycle on average. The

dynamics of the volume (number of exercises) during the preparatory period is shown in **Figure 1**. The curve is undulating. We can see the trend during this period of preparation.

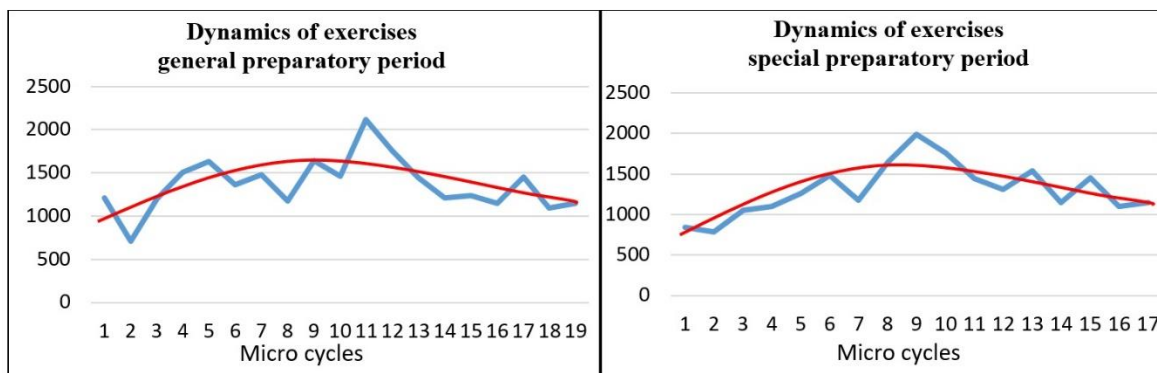


Figure 1. Dynamics of the volume (number of exercises) during the preparatory period

Figure 2 shows the dynamics of the index of intensity for the preparatory period. The curve is undulating. The first stage was characterized with 0.82 exercises/min mean intensity and the second

stage – with 1.15 exercises/min. There was an upward trend in the intensity during this period. The intensity continued to rise in the competitive period (**Figure 3**).

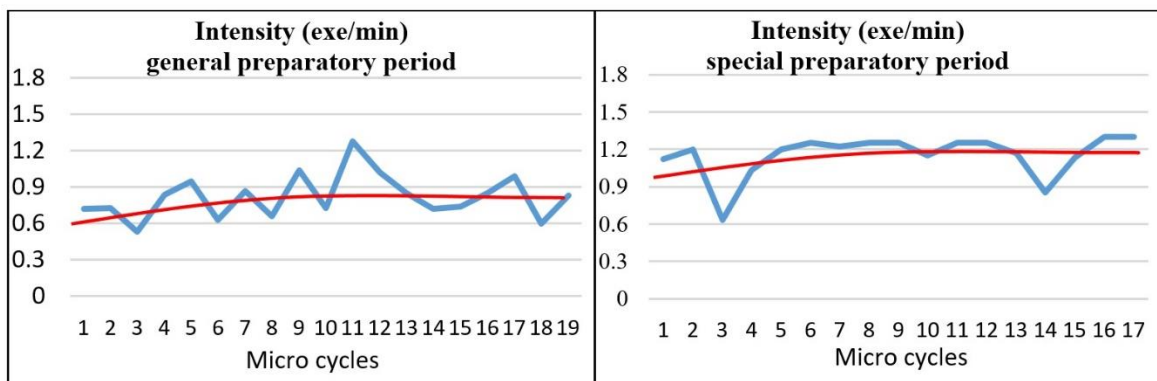


Figure 2. Intensity in preparatory period

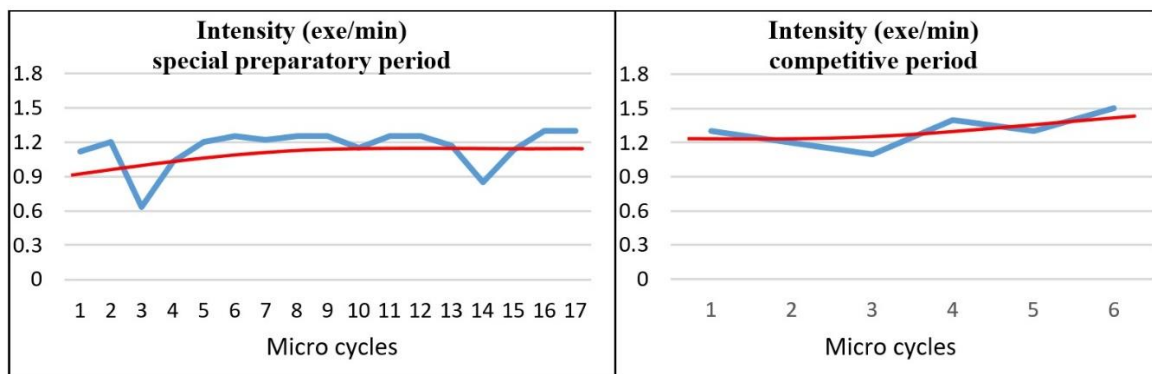


Figure 3. Intensity in special preparatory period and competitive period

In **Figure 4** we can see the special dynamics of the executed routines for the special preparatory period and competitive period. The curve is undulating and there is an upward trend. The number of the routines decreased before the upcoming competition in 6th micro cycle of the

competitive period. Another specific index, registered in the special preparatory period and the competitive period, is the coefficient of efficiency (**Figure 5**). It depends on the number of the executed routines. We can see in the figure that at the beginning of the stage (1st-3rd micro cycle) it

was within 20-25%. Afterwards, it gradually increased and at the end of the stage it was within 38-48%. During the competitive period it was 58%

on average and reached 82% at the end of the period.

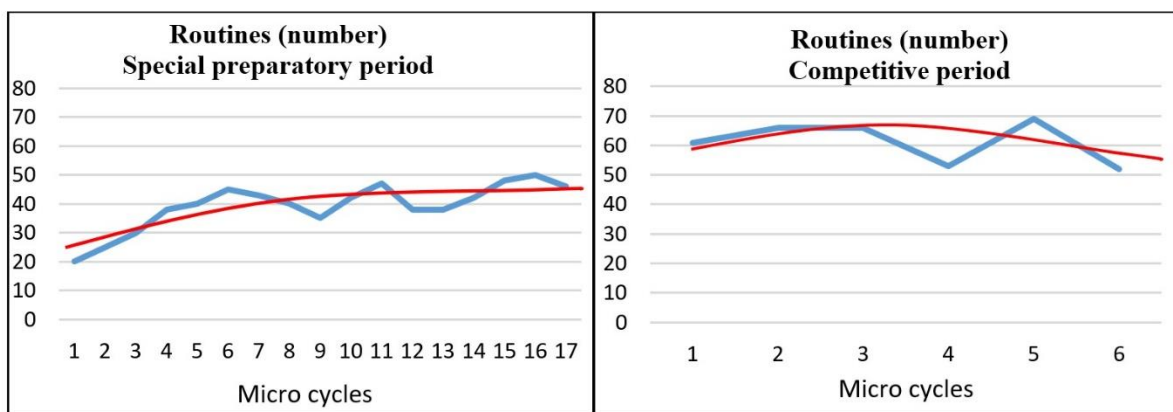


Figure 4. Executed routines in special preparatory period and competitive period

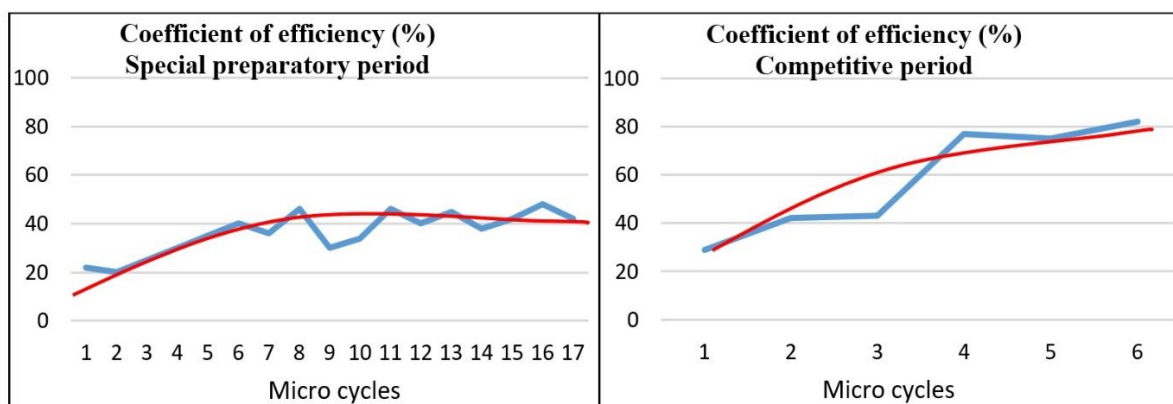


Figure 5. Coefficient of efficiency in special preparatory period and competitive period

CONCLUSIONS AND RECOMMENDATIONS

The results from tracing the training load showed a high level of athletes' preparation. We should point out that the researched team is a champion in the team and individual ranking. Due to lack of similar research in this area, we could not compare the data about the researched indexes for the training load, but in our opinion the values were optimal for this age group. During the competitive period, the number of the routines per training session was 2 routines on an apparatus. We recommend that their number be increased to 3-4 routines on an apparatus in the micro cycles before competitions. The difficulty of execution of the routines is not high in this age group (12-13-year-old) and allows for performing a greater number of routines per training session. This would increase the level of preparation of the athletes. Yet, we

should take the individual abilities of the competitors into consideration. At this age, the high levels of the training load are the reason why many athletes quit practicing sports such as artistic gymnastics.

On the basis of the results achieved in the National Championship, we can claim that the presented indexes of training load in artistic gymnastics can be used as a starting model of preparation for the gymnasts belonging to this age group.

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