A comparative examination of the allocation of training burdens for elite mogul skiers throughout the year

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Abstract

Objective of the study was to comparative examination of the allocation of training burdens for elite mogul skiers throughout the year, using data from 2021 to 2024.

Methods and structure of the study. The workload of 12 top-tier Russian mogul skiers was determined through the examination of their training logs.

Results and conclusions. The disparities in the metrics that describe the overall training loads in the Olympic and non-Olympic annual training cycles have been identified, and the peculiarities of the load distribution in the preparatory and competitive phases have been emphasized. The values of the loads outlined in the federal standard for sports training in freestyle significantly surpass the actual number of training sessions and time. It was discovered that the training sessions in the preparatory phase are longer in duration, while in the competitive phase they are shorter but more frequent. The Olympic annual cycle is characterized by a higher volume of specialized loads. The findings of this research can be regarded as contemporary models for periodization in the sports training of elite mogul skiers.

Keywords: *mogul, freestyle, load planning, periodization, annual training cycle, highly qualified athletes.*

Introduction. Mogul and dual mogul are Olympic freestyle sports. Mogul is characterized by complex coordination techniques of movements that mogul skiers demonstrate during a high-speed descent along a hilly ski slope and performing acrobatic tricks from ski jumps [2]. In each sport, when working with highly qualified athletes, specialists pay special attention to planning training loads, taking them into account and analyzing them in the annual training cycle. This approach, subsequently recognized by scientists around the world as “classical”, was first scientifically substantiated by L.P. Matveyev [3], which then began to be actively used by scientists in various sports [1, 4]. The result of this extensive scientific work was the substantiation of alternative models of periodization, distribution and ratio of loads based on the specifics of a particular sport. To date, scientists have identified and characterized models of periodization of training loads in biathlon and cross-country skiing [5], but similar studies in freestyle, in general, and in moguls, in particular, have not yet been conducted, which complicates the planning of pedagogical influences in the annual training cycle and does not allow us to answer the question that is important for high-performance sports: is there a difference in the volume of training of highly qualified moguls in the Olympic and non-Olympic seasons?

Objective of the study was to comparative examination of the allocation of training burdens for elite mogul skiers throughout the year, using data from 2021 to 2024.

Methods and structure of the study. The following methods were used in the work: theoretical analysis of scientific and methodological literature and documents, modeling, statistical processing of the research results.

During the study, the distribution of training loads of Russian highly qualified mogul skiers, members

of the Russian freestyle skiing team and participants in the XXIV Olympic Winter Games in 2022 in Beijing (PRC) was monitored. Based on the results of the preliminary study, we selected 12 electronic diaries that were filled out by athletes daily in the period from 2021 to 2024. Information was collected in the process of scientific and methodological support for sports training. Loads were monitored in the conditions of centralized and home training. Control over filling out sports diaries by mogul skiers was carried out by members of the integrated scientific group.

When calculating the time for physical training of mogul skiers based on the data of the Federal Standard of Training in the sport of «freestyle» (hereinafter – FSST), the percentage of general and special physical training was combined. At the same time, due to the impossibility of accurately determining the time for tactical training from the latest edition of the standard, we used only data on the time of technical training[1].

Modeling was used in the distribution of monthly volumes of loads of various types of highly qualified mogul skiers.

The check for compliance with the normal distribution law was performed using the Shapiro-Wilkie criterion. Since in our case the obtained results had an abnormal distribution, the reliability of the differences between samples was determined using the Mann-Whitney criterion.

[1] Prikaz Ministerstva sporta RF № 876 ot 31.10.2022 g. «Ob utverzhdenii federalnogo standarta sportivnoy podgotovki po vidu sporta «fristayl» (zaregistrirovano v Minyuste Rossii 5.12.2022 № 71346). [Electronic resource]. Available at: https://base.garant.ru/405875915/ (date of access: 24.02.2024).

Results of the study and discussion. It was established that the Olympic annual cycle (hereinafter referred to as OAC) differed to a greater extent from the non-Olympic cycle (hereinafter referred to as NAC) in the number of training days (241 and 200 days), classes (556 and 424 classes), total training time (1030:38 and 830:19 h:min) and time for technical and tactical training (506:05 and 339:01 h:min) ($p<0,01$) (see Table 1). The analysis of the ratio of loads in the preparatory (hereinafter referred to as PP) and competitive periods (hereinafter referred to as CP) of the OAC showed that mogul athletes in the PP had fewer training days and sessions compared to the CP, but the training time spent on physical and technical-tactical training was greater than in the CP. This fact is explained by the longer duration of training sessions in the PP and shorter (but more frequent) - in the CP ($p < 0,01$). The study of the distribution of loads of the same NAC indicators showed that all load parameters in the PP exceeded similar characteristics in the CP. Comparing the total volumes of loads of the OAC and NAC with similar characteristics of the FSST, we note that the standard data on the volume of training sessions and time significantly exceeded the actual ones (Table 1).

Comparison of the total volumes of loads (Table 2) showed that the NAC had significantly higher volumes of speed-strength and coordination training, and the OAC had significantly higher volumes of aerobic training, while the volumes of strength training in the OAC and NAC were comparable ($p<0,05$). Studying the characteristics of the distribution of

Table 1. General characteristics of the distribution of training loads of highly qualified mogul skiers in the annual training cycle

Indicators	OAC, M±m				NAC, M±m				p_{2-6}	FSST
	AC	PP	CP	p_{3-4}	AC	PP	CP	p_{7-8}		
1	2	3	4	5	6	7	8	9	10	11
Training days, number	241±10,21	94±5,13	147±5,2	**	200±13,5	108±15,7	92±2,28	-	**	нет данных
Training sessions, number	556±39,5	196±6,4	360±33,05	**	424±18,18	220±11,90	204±8,26	*	**	624-832
Training time, h:min	1030:38±6,11	615:38±9,45	415:00±5,03	**	830:19±11,70	499:10±11,7	331:09±7,29	**	**	1248-1664
Time on FP, h:min	524:33±14,84	327:53±12,50	196:40±3	**	491:18±21,85	269±22,21	222±5,74	**	-	437-832
Time on TTP, h:min	506:05±9,5	287:45±4,4	218:20±8	**	339:01±10,3	230±9,8	109±9,7	**	**	374-832

*Note: OAC – Olympic annual cycle in the 2021-2022 season; NAC – non-Olympic annual cycle (based on average values of the 2022-2023 and 2023-2024 seasons); TC – total volume of loads in the annual cycle; PP – preparatory period; CP – competitive period, FSST – Federal Standard of Sports Training in the sport of freestyle in the latest edition; * – differences are significant at the level of p≤0.05; ** – differences are significant at the level of p≤0.01; – – differences are significant at the level of p>0.05.*

Table 2. The ratio of training loads developing various physical qualities and abilities of highly qualified mogul athletes in the annual training cycle

Indicators	OAC, M±m				NAC, M±m				p_{2-6}
	AC	PP	CP	p_{3-4}	AC	PP	CP	p_{7-8}	
1	2	3	4	5	6	7	8	9	10
Volume of speed-strength training, hr:min	12:25±0,58	11:45±0,58	0:40±0,58	**	16:05±3,31	14:18±3,20	2:37±0,75	**	*
Volume of strength training, hr:min	165:03±12,49	119:43±18	45:20±7,23	**	164:14±7,88	106:55±6,44	55:19 ±4,46	**	*
Volume of general training and flexibility means, hr:min	123:25±9,71	71:20±10,54	52:05±3,1	**	122:17±7,3	68:13±7,3	54:05±1,6	**	-
Volume of coordination training, hr:min	42:59±7,21	22:43±5,57	20:16±3	-	57:37±8,36	37:37±6,5	20:00±4,18	**	*
Volume of aerobic training, hr:min	174:51±6,66	128:29±10,26	46:22±3,51	**	118:31±11,13	73:19±7,92	45:11±3,54	**	**

Table 3. Distribution of training loads of technical, tactical and special orientation of highly qualified mogul skiers in the annual training cycle

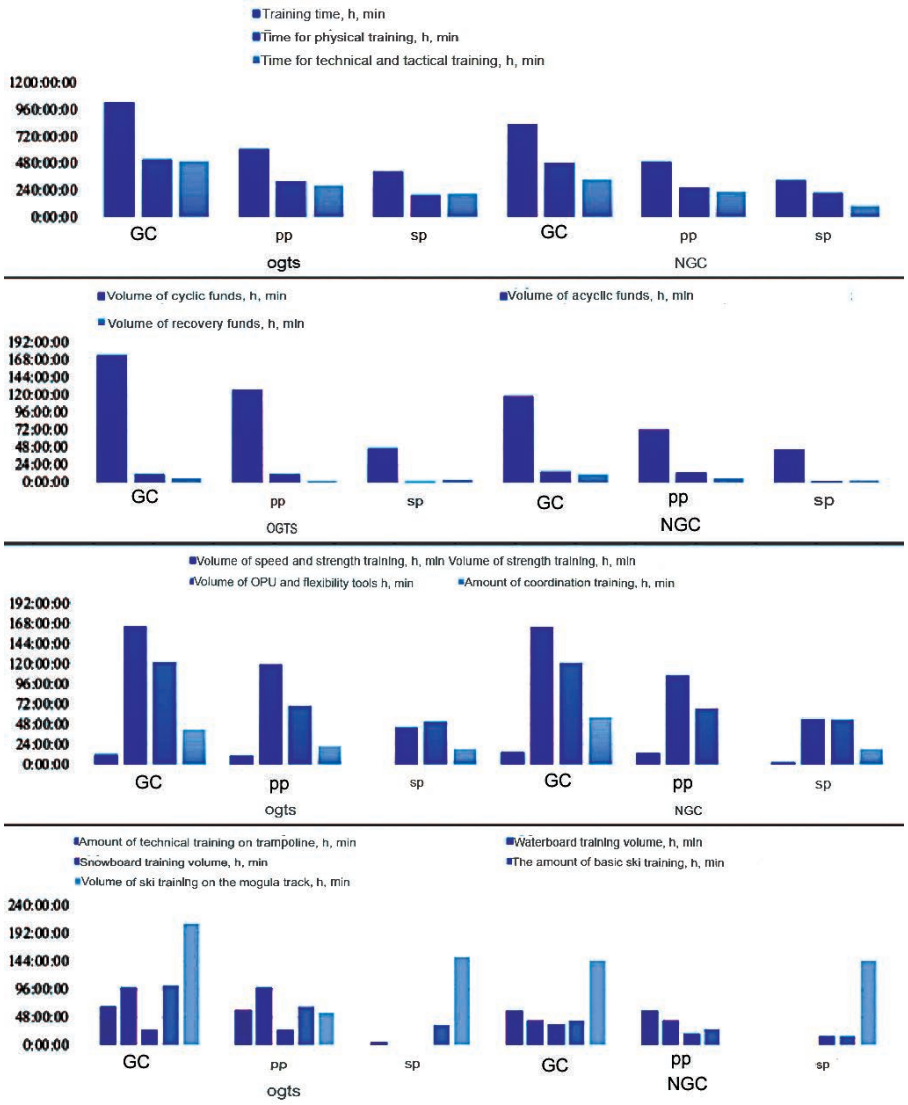
Indicators	OAC, M±m				NAC, M±m				p_{2-6}
	AC	PP	CP	p_{3-4}	AC	PP	CP	p_{7-8}	
1	2	3	4	5	6	7	8	9	10
Volume of TP on trampoline, hr:min	67:25±5,13	61:55±4,58	5:20±0,5	**	59:17±7,56	59:17±7,56	0	**	-
Volume of training on water ski jump, hr:min	100:40±14,15	100:40±14,15	0	**	42:33±6,71	42:33±6,71	0	**	**
Volume of training on snow ski jump, hr:min	27:15±6,03	27:15±6,03	0	**	37:40±5,58	21:16±3,83	16:23±2,25	*	*
Volume of basic ski training, hr:min	102:45±6,56	67:30±7,09	35:15±2,08	**	43:37±7,9	27:37±5,96	16:00±2,81	**	**
Volume of alpine ski training on mogul track, hr:min	210:00±9,54	56:40±6	153:20±3,61	**	147:10±8,50	0	147:10±8,50	**	**

loads by periods of the OAC, it should be noted that the volumes of pedagogical influences in the PP were significantly higher than in the CP ($p<0,01$). The same trend was observed in all indicators of the NAC load ($p<0,01$).

Table 3 shows the distribution features of special loads of mogul skiers in the OAC and NAC. Comparison of the total volumes of loads showed that greater priority in the OAC is given to training on the water ski jump (100:40 h:min), basic skiing (102:45 h:min) and alpine skiing (210:00 h:min) ($p<0.05$). Analysis of the ratio of loads between the periods of the OAC showed that in the PP, technical training on the trampoline, on the water and snow ski jumps, as well as basic skiing, significantly prevails, while the CP is characterized by a higher volume of special alpine skiing training ($p<0,01$). This trend in the ratio of loads between the PP and CP is also observed in the NAC ($p<0.01$).

The figure shows the models of periodization of the most significant types of loads for highly qualified mogul athletes in the OAC and NAC according to the parameters of the total volume for the annual cycle, as well as with the distribution of the values of pedagogical influences in the PP and CP. The presented data can be used by coaches and specialists as guidelines when constructing an annual training cycle for mogul athletes at the stage of higher sports mastery, but taking into account the available training and competitive conditions and opportunities.

Conclusions. The OAC is characterized by a large volume of training loads in general, as well as a more significant concentration of special loads. At the same time, the actual volume of training time for mogul athletes is significantly less than stated in the standard. The data obtained as a result of the study can be used as a modern periodization of training loads in the annual training cycle of elite mogul athletes.



Models of periodization of some types of loads of highly qualified mogul skiers in the annual training cycle

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