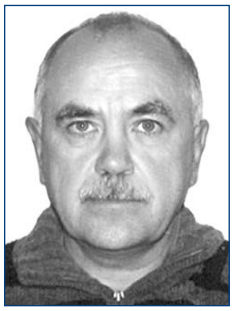
Methodological aspects of using essential oils in training young sprinters

UDC 796



M.V. Popov[1]
Dr. Biol., Professor **N.N. Sentyabrev**[2]
PhD, Associate Professor **I.A. Ushakova**[1]
PhD, Associate Professor **A.G. Kamchatnikov**[2]
[1]Volgograd State Medical University, Volgograd
[2]Volgograd State Physical Education Academy, Volgograd

Corresponding author: nnsvgsp@rambler.ru

Received by the editorial office on 27.08.2024

Abstract

Objective of the study was to based on the evaluation of the impact of essential oils on the physical condition and athletic abilities of athletes, we aim to create a framework for incorporating essential oils into the train-ing regimen of young sprinters.

Methods and structure of the study. The state of the muscles in terms of their functional activity was evaluated based on myotometry data. Additionally, specific performance indicators were measured, such as the maximum time for bi-cycle ergometric work at PWC170 power and the time taken to run a control dis-tance of 100 meters.

Using video recording, the running step indicators were measured on segments of 30-40 meters and 80-90 meters. The results were analyzed using the Dartfish computer program (Switzerland). The program calculated the running speed V, the time for each step T, the reference time t, the flight time tp, the frequency of steps (pace) f, and their length l.

Results and conclusions. The impact of essential oils enhanced the capacity for muscle relaxation while preserving the ability to reach peak performance. The maximum time spent on the bicycle ergometer increased at the PWC170 level. The time taken for the control run at a distance of 100 meters was improved. This was due to positive changes in the parameters of the running stride at the end of the distance, which helped maintain the running speed. The study identified a set of guide-lines for the use of essential oils in training, and based on this, an algorithm and methodology for the use of essen-tial oils in the training of young short-distance runners were developed, tailored to their specific needs. Subsequent experimental validation confirmed the efficacy of the proposed approach.

Keywords: *young athletes, special performance, essential oils, relaxation, methods of using essential oils.*

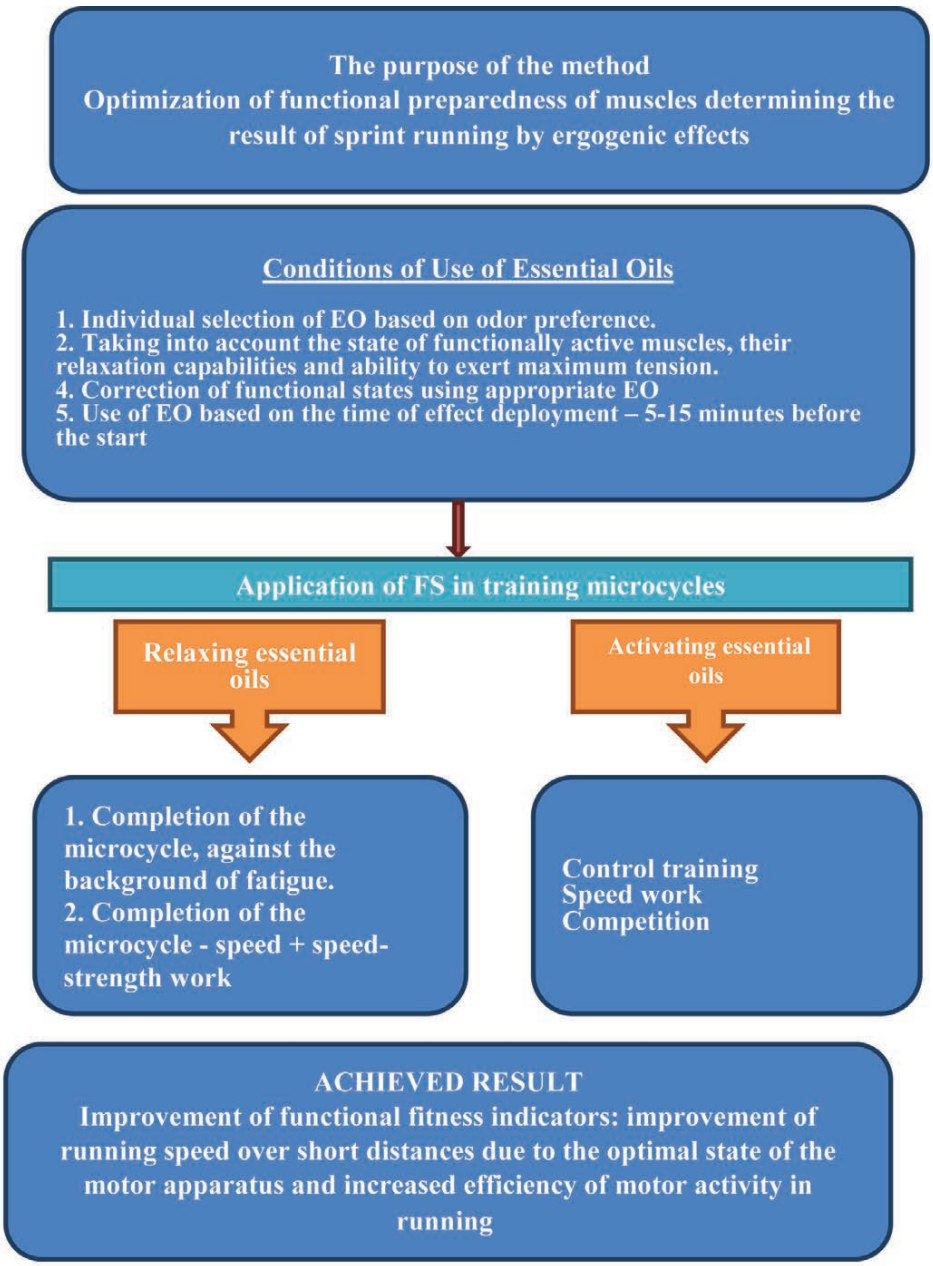
Introduction. Essential oils (EO) are currently used quite widely to influence the functional state (FS) of humans [1, 2, 7]. The possibilities of using EO in sports are being studied [3, 6]. Data have been obtained on a decrease in fatigue after physical exercise in animals that inhaled the smell of EO [8]. Of particular interest for sports practice is information on the positive effect of EO on the coordination of movements [4]. However, the methodological and technological features of using EO in sports training have not been sufficiently developed, especially for young athletes.

Objective of the study was to based on the evaluation of the impact of essential oils on the physical condition and athletic abilities of athletes, we aim to create a framework for incorporating essential oils into the training regimen of young sprinters.

Methods and structure of the study. The study involved young athletes involved in short-distance running. Two groups were formed: the main group, OG (n=9 young men) and the comparison group, CG (n=10), aged 15-16 years. The state of functionally active muscles was assessed according to myotonometry data (in conventional units of myotons, M), bicycle ergometric indicators of special performance. The running time over a distance of 100 m and the running step indicators for segments of 30-40 m and 80-90 m were determined (video filming, speed 30 frames/sec). The data were processed by the Dartfish computer program (Switzerland), running speed V, running step time T, support time to, flight time tп, step frequency (tempo) f and their length – l were calculated. Both groups of runners trained according to the same

type of plans. The OG participants inhaled relaxing or activating EO during training; the effects of EO with a subjectively preferred odor were studied. The level of intragroup differences was determined using the Wilcoxon test; the Mann-Whitney test was used to assess intergroup differences.

Results of the study and discussion. Before the training microcycle, no significant differences in muscle condition were found in the compared groups. By its completion, the relaxation capabilities of muscles implementing sports activities (running) somewhat worsened in the GS: elastic tone Et increased from 81,0±0,63 to 83,2±0,62 M, the «residual tone» indicator Rt (fatigue characteristic) increased from 0,5±0,22 to 1,9±0,23 M. As a result, the functional capabilities of muscles by the At value decreased from 18,0±1,07 to 15,2±0,92 M. All changes were statistically significant (Temp = 1, P < 0,01). During the same period, in the OG with regular use of EO, the deterioration of Et was less pronounced (growth from 80,56±0,56 to 81,89±0,51 M, Temp = 5,5, P < 0,01). The Ot indicator increased less than in the CG: from 0,44±0,18 to 0,89±0,35 M (Temp = 17, P > 0,05). At remained virtually unchanged (from 17,78±0,70 to 17,68±0,44, Temp = 14, P > 0,05). Thus, the functional capabilities of the muscles deteriorated significantly less in the OG compared to the CG. Control testing of young athletes from the OG who used EO showed an increase in



Scheme of the method of using essential oils in the training process

Features of using EO depending on the focus of the training process

Stage		Weeks	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Preparatory period		**Control**	**S**	A	**S**	A	**C**	A**S**
	GPS	1 week	SA	A	SA	A	AS	AS
		2 week	AS	AS	AS	AS	AS	AS
		3 week	SSW, A,C	SSW	SSW, A,S	SSW **REO)**	SSW, A,S	SSW
		4 week	SR, SSW	C, SSW	SR, SSW	C, SSW **(REO)**	SR, SSW	S, SSW
		Control	A, SSW	SSW	C (PEO)	SSW **(REO)**	C (PEO)	SSW,S
	SPS	1 week	SA	A	CA	A	AS	AS
		2 week	AS	AS	AS	AS	AS	AS
		3 week	SSW, A,S	SSW	SSW, A,S	SSW	SSW, A,S	SSW
		4 week	SR, SSW	S, SSW	SR, SSW	C, SSW	SR, SSW	S, SSW
		Control	A, SSW	SSW	C (PEO)	CKC **(REO)**	C (PEO)	SSW,S

*S – strength work, A – aerobic work, SSW – speed-strength work, SR – speed work, C – control training. PEO – preferred EO; **REO** – relaxing EO. GPS – general preparatory stage, SPS – special preparatory stage.*

special performance. The maximum time of performing bicycle ergometric loads of maximum power increased from 12,12±0,32 to 13,94±0,27 sec (Temp = 4,5, P < 0,01). The 100 m running time improved from 12,44±0,08 to 12,34±0,09 sec (Temp = 5,5, P < 0,01). In the GS, statistically significant changes in special performance were not noted. It can be assumed that changes during this period of the training process can be realized mainly due to an increase in the mobilization capabilities of young athletes.

The changes in running parameters were determined at different distance segments using EO. In the OG, during the initial testing, the running step characteristics at the 2nd segment of 80-90 m of the distance significantly worsened compared to the 1st segment of 30-40 m. At segment 2, the time of the support phase of the running step increased from 0.129±0.006 to 0.136±0.002 ms, unsupported from 0,126±0,009 to 0,131±0,003, the step frequency (in sec) decreased from 3,87±0,104 to 3,77±0,055 (P> 0,05). The result was a decrease in running speed from 7,89±0,075 (segment 1) to 7.61±0.085 (segment 2, P<0,05). Testing conducted under EO influence showed that in the second segment, compared to the first segment, the support time increased by 4,68%, and the step frequency decreased by 2,06%. These changes were less pronounced than in the initial testing. The step length in the second segment increased by 2,04%, and after exposure to EO – by 3,5%. The sum of such changes in running step indicators caused a smaller drop in speed after exposure to EO in the finishing segment, from 7,88±0,334 to 7,80±0,419 (by 1,01%, P<0,05), i.e. less than without the use of EO. The changes that occur when using EM reflect the growth of muscle relaxation abilities. This results in greater economy of movements, which is the main reason for maintaining running speed along with structural changes in the running step. Thus, the ergogenic potential of EO is demonstrated.

The conditions for using EO in the training process are revealed. First: when using a calming EO, the support and flight time increased, the frequency of steps decreased with an increase in their length. The effect of an activating EO caused minimal changes in the support time, frequency and length of the running step. Second, the preference for EO odors: better trained young men more often preferred calming EO (57%), and less trained ones – activating (58%). This is consistent with other studies that have shown the significance of EO odor preference [5].

The results of these and our previous studies became the basis for developing a methodology for using EO as ergogenic aids in the training process of young sprinters (see figure and table). The nature of the EO used was determined by the focus of the microcycles of the training process and the identified conditions of their use. *Scheme of the method of using essential oils in the training process*

Conclusions. The use of EO in the training process of young sprinters prevents undesirable deterioration of the functional capabilities of muscles that directly determine the result of running. Increased special performance is the result of the growth of the ability of young athletes to mobilize the existing potential of the body. The method of using EO in the training process of young sprinters is based on taking into account the relaxation capabilities of muscles, the degree of their fatigue, individual selection of EO (preference for

smell) and the use of essential oils depending on the focus of the training process.

References

1. Kostanova A.V., Dergachev D.S., Subotyalov M.A. Terapevticheskiy potentsial aromaterapii. Effektivnaya farmakoterapiya. 2021. Vol. 17. No. 18. pp. 50-55.
2. Petrova E.A., Pichugin P.V. Aktualnyye problemy izucheniya mira aromatov: mezhdistsiplinarnyy podkhod. Uchenyye zapiski Rossiyskogo gosudarstvennogo sotsialnogo universiteta. 2021. Vol. 20. No. 2(159). pp. 5-9.
3. Safronova N.S., Polyanchikov V.V. Vliyaniye protsedur s efirnymi maslami na psikhofunktsionalnoye sostoyaniye sportsmenov s porazheniyem oporno-dvigatelnogo apparata. Nauchnyy vestnik Kryma. 2021. No. 3(32). pp. 1-8.
4. Chang H.T., Chang M.L., Chen Y.T., Chang S.T., Hsu F.L., Wu C.C., Ho C.K. Evaluation of Motor Coordination and Antidepressant Activities of Cinnamomum osmophloeum ct. Linalool Leaf Oil in Rodent Model. Molecules. 2021 May 19;26(10):3037.
5. Koteles F., Babulka P. Role of expectations and pleasantness of essential oils in their acute effects. Acta Physiol Hung. 2014 Sep;101(3):329-40.
6. Miranda Neto M., Meireles A.C.F., Alcântara M.A., de Magalhães Cordeiro A.M.T., Silva A.S. Peppermint essential oil (Mentha piperita L.) increases time to exhaustion in runners. Eur J Nutr. 2023 Dec;62(8):3411-3422.
7. Sattayakhom A., Wichit S., Koomhin P. The Effects of Essential Oils on the Nervous System: A Scoping Review. Molecules. 2023 Apr 27;28(9):3771.
8. Zhang W., Shi R., Gao T., Hu Y., Zhou J., Li C., Wang P., Yang H., Xing W., Dong L., Gao F. Repeated Inhalation of Peppermint Essential Oil Improves Exercise Performance in Endurance-Trained Rats. Nutrients. 2023 May 26;15(11):2480.