

Mosk. Un-ta, 1972. – 248 s.

5. *Djilani A., Dicko A.* (2012). The Therapeutic Benefits of Essential Oils, Nutrition, Well-Being and Health, Dr. Jaouad Bouayed (Ed.), ISBN: 978-953-51-0125-3, InTech, Available from: <http://www.intechopen.com/books/nutrition-well-being-and-health/the-therapeutic-benefits-of-essential-oils>

6. *Kassab R.B., Bauomy A.A.* The neuroprotective efficiency of the aqueous extract of clove (*Syzygium aromaticum*) in aluminium-induced neurotoxicity // International Journal of Pharmacy and Pharmaceutical Sciences. – 2014. - Vol 6. - Issue 5. – P. 503-508.

The article was received at editors 26.10.2015

Bekmambetov T.R., Tonkovtseva V.V., Litvinchuk N.I., Yarosh A.M. Essential oil of *Syzygium Aromaticum* and its effect on psychophysiological state of people breathing it in different concentration during exercise // Bull. of the State Nikit. Botan. Gard. – 2015. – № 117. – P. 17-23.

Essential oil of *Syzygium Aromaticum* provokes euphoric effect during prolonged medium exercise; on the background of physical activity it is pronounced only in case of the highest study concentration – 2,0 mg/m³. Essential oil of *Syzygium Aromaticum* possesses hypotensive effect as well.

Key words: *essential oil, Syzygium Aromaticum, eastern dances, exercise load, psychoemotional state, WAM test, nervous system, cardiovascular system.*

UDK 547.913:634.334:331.103.2:599.89

ESSENTIAL OIL OF *SALVIA SCLAREA* AND ITS EFFECT ON PSYCHOPHYSIOLOGICAL STATE OF PEOPLE BREATHING IT IN DIFFERENT CONCENTRATION DURING EXERCISE

Timur Rustemovich Bekmambetov¹, Valentina Valeriyevna Tonkovtseva¹, Nataliya Ivanovna Litvinchuk², Aleksandr Mikhailovich Yarosh¹

Nikita Botanical Gardens – National Scientific Centre
298648, Republic of the Crimea, the city of Yalta, urb.vil. Nikita
valyalta@rambler.ru

²Dance school “Ariadna”, Simferopol
aridancers@gmail.com

Introduction

Essential oil (EO) of *Salvia Sclarea* L. is used extensively in aromatherapy [4]. Its composition is quite close to *Lavandula officinalis* L. EO: principal components are linalyl acetate, linalool, geranylacetate and terpineol [5]. EO of *Salvia Sclarea* L. possesses antidepressive [6], stress limiting [7] and hypotensive [3] effects.

Objective of this work is to investigate if that's possible to optimize human psychophysiological state during prolonged and medium exercise applying essential oil of *Salvia Sclarea* L.

Objects and methods of the research

A group of 20 women aged by 20-50 was involved into this study. Control one was

similar group by composition and size. 90-minute eastern dance class was chosen as a physical load. In a control group the exercise was held without extra effects. While people of experimental group could breath *Salvia Sclarea* L. EO of the following concentrations: 0,5; 1,0 or 2,0 mg/m³.

WAM (well-being, activity, mood) test was to assess EO effect on nervous system [2, 3], for cardiovascular system we measured heart rate (HR), systolic (BPS) and diastolic (BPD) blood pressure.

Nervous system parameters were tested before and after exercise, cardiovascular system – before and after exercise and in 15 minutes after the class finished.

Findings were processed statistically applying t-criterion by Student for associated and independent sampling.

Results and discussion

According to parameter of WAM test initially experimental group, having done exercise under influence of *Salvia Sclarea* L. EO, 2,0 mg/m³, and control group didn't have any significant differences (table 1).

After exercise without extra effect of *Salvia Sclarea* L. EO (control group) there was a significant improvement of well-being, mood, vivacity, and a tendency to improve general condition. Otherwise a dance session, as it is, demonstrates euphoric effect.

Atmosphere concentrated with *Salvia Sclarea* L. EO provoked significant improvement of psychoemotional state by all study parameters. At the same time finite values of tension reduction and rise of vivacity were much higher in comparison with control group. On the whole dance session held with *Salvia Sclarea* L. EO, 2,0 mg/m³, resulted significant improvement of psychoemotional state of tested people than in a control group.

Table 1

Effect of *Salvia Sclarea* L. EO, 2,0 mg/m³, on psychoemotional state of tested people (WAM test parameters, standard units)

Parameter	Experimental group initially	Control group initially	Experimental group after procedure	Pex b/a<	Control group after procedure	Pc b/a<	Pex/c after<
General condition	151,45 ±6,43	150,75 ±6,89	166,75 ±5,03	0,002	156,95 ±5,80	0,08	-
Well-being	148,20 ±7,43	149,95 ±7,08	167,75 ±5,03	0,0007	158,65 ±6,10	0,02	-
Mood	150,80 ±7,12	158,85 ±6,08	171,10 ±5,13	0,005	166,15 ±4,26	0,03	-
Weakness - capacity to work	141,40 ±7,86	145,35 ±7,08	159,20 ±6,38	0,01	146,60 ±6,38	0,88	-
Tension – relaxation	140,55 ±8,45	135,05 ±4,46	161,80 ±6,13	0,01	142,00 ±7,33	0,32	0,05
Inertness –vivacity	140,45 ±7,62	134,75 ±7,08	165,70 ±5,04	0,003	148,00 ±6,29	0,03	0,05
Absent-mindedness – attentiveness	139,60 ±5,49	132,20 ±6,67	152,95 ±5,70	0,02	141,05 ±4,93	0,11	-

According to WAM test initially experimental group having had a dance class in the room concentrated with *Salvia Sclarea* L., 1,0 mg/m³ and a control group didn't have any significant differences (table 2).

After class without EO control group demonstrated a rise of general condition, well-being mood, vivacity.

After dance class in the room concentrated with *Salvia Sclarea* L. EO experimental

group actually demonstrated significant improvement of all study parameters like in previous case. But finite values of well-being, mood, capacity to work, vivacity were registered much higher than in the control group, attentiveness tended to rise.

On the whole dance session held in atmosphere concentrated with *Salvia Sclarea* L. EO, 1,0 mg/m³ resulted much more significant improvement of psychoemotional state of test participants than in case of 2,0 mg/m³.

Table 2

Effect of *Salvia Sclarea* L. EO, 1,0 mg/m³, on psychoemotional state of tested people (WAM test parameters, standard units)

Parameter	Experimental group initially	Control group initially	Experimental group after procedure	Pex b/a<	Control group after procedure	Pc b/a<	Pex/c after<
General condition	136,05 ±8,21	137,85 ±7,05	159,15 ±6,05	0,0002	146,25 ±5,26	0,02	-
Well-being	142,00 ±8,35	134,65 ±8,01	165,15 ±5,74	0,0001	145,75 ±6,14	0,03	0,05
Mood	139,65 ±9,46	146,10 ±6,09	170,90 ±5,26	0,0001	155,75 ±3,99	0,01	0,05
Weakness - capacity to work	145,30 ±7,24	134,85 ±7,49	164,10 ±5,92	0,02	140,05 ±6,03	0,23	0,01
Tension – relaxation	128,90 ±8,18	129,55 ±4,37	147,15 ±7,97	0,02	138,45 ±6,99	0,19	-
Inertness –vivacity	128,30 ±8,30	125,95 ±7,65	161,15 ±6,04	0,0002	141,10 ±6,61	0,03	0,05
Absent-mindedness – attentiveness	129,70 ±7,74	127,95 ±7,66	152,15 ±6,25	0,003	136,00 ±5,07	0,20	0,1

Investigating effect of *Salvia Sclarea* L. EO of 0,5 mg/m³ according to WAM test, initially both groups didn't have any significant differences like in previous tests (table 3).

Table 3

Effect of *Syzygium Aromaticum* L. EO, 0,5 mg/m³, on psychoemotional state of tested people (WAM test parameters, standard units)

Parameter	Experimental group initially	Control group initially	Experimental group after procedure	Pex b/a<	Control group after procedure	Pc b/a<
General condition	139,50 ±5,96	132,95 ±6,35	144,90 ±7,51	0,37	146,95 ±5,70	0,01
Well-being	143,25 ±6,54	133,00 ±6,82	145,10 ±8,11	0,77	148,25 ±6,68	0,01
Mood	145,40 ±8,71	148,15 ±5,79	158,10 ±6,14	0,08	159,95 ±4,58	0,001
Weakness –capacity to work	129,15 ±8,82	127,85 ±6,72	135,75 ±9,71	0,48	144,30 ±6,72	0,04
tension – relaxation	130,85 ±7,59	125,45 ±4,64	141,05 ±7,45	0,29	143,05 ±7,36	0,03
Inertness – vivacity	121,20 ±8,87	117,95 ±6,61	130,90 ±9,28	0,35	143,80 ±7,22	0,01
Absent-mindedness – attentiveness	127,45 ±6,91	123,55 ±7,21	128,95 ±7,14	0,85	138,35 ±4,92	0,03

After exercise without essential oil (control group) there was a significant rise of all study parameters of human psychoemotional state.

After dance session with essential oil (experimental group) positive changes were not so pronounced as in control group: mood tended to rise only. But finite values of control and experimental hardly differ.

While studying effect of *Salvia Sclarea* L. EO, 2,0 mg/m³, on cardiovascular system initially (before procedure) there weren't any significant differences between values of BP and HR in control and experimental groups (table 4). In this case in both groups average values of BPS and BPD were at high rate by JNC6, HR – higher.

After dance session without EO (control group) values of BPS and HR didn't change from initial data, BPD tended to increase.

In experimental group just after dance class with *Salvia Sclarea* L. EO BPS reduced much, HR rose and BPD didn't change. In 15 minutes BPS and BPD were back to initial values and those just after dance class.

In 15 minutes values of BPS, BPD and HR corresponded to initial data. In experimental group in 15 minutes after dance class BPS remained reduced parameters, BPD value became lower than initial, HR got back to mark before procedure.

Table 4
Effect of *Salvia Sclarea* L. EO, 2,0mg/m³ on blood pressure (mm of mercury) and heart rate (bpm) during exercise

Parameter	Before procedure	After procedure	P <	in 15 min after procedure	before proced. / in 15 min after procedure P<	after procedure. / in 15 min after procedure P<
BPS Experimental group	139,60 4,46	131,55 2,77	0,04	130,40 2,32	0,01	0,59
BPS Control group	135,45 ±4,47	130,60 ±3,70	0,22	130,00 ±3,43	0,21	0,85
BPD Experimental group	87,80 3,06	89,95 1,74	0,30	83,70 2,21	0,02	0,00002
BPD Control group	86,90 ±2,70	89,55 ±2,18	0,10	88,15 ±2,51	0,40	0,29
HR Experimental group	79,90 3,86	93,05 4,45	0,01	84,50 3,42	0,15	0,002
HR Control group	79,75 ±2,99	83,66 ±3,04	0,17	76,05 ±2,24	0,12	0,0001

While studying effect of *Salvia Sclarea* L. EO, 1,0 mg/m³ on cardiovascular system it was found out that initially BPS, BPD and HR in both groups didn't have any significant differences (table 5).

After dance session without essential oil (control group) value of BPS didn't change, BPD increased significantly, HR tended to rise. In 15 minutes after dance class these values got initial marks.

In the experimental group after dance session in the room concentrated with *Salvia Sclarea* L. EO BPD decreased, while BPS tended to slow down, HR didn't change.

In 15 minutes after dance class in the control group values of BPS, BPD and HR

didn't differ from initial.

In the experimental group after dances values of BPS and HR were almost on the same mark, but BPD decreased and became lower than before and after procedure.

Table 5

Effect of *Salvia Sclarea* L. EO, 1,0 mg/m³ on blood pressure (mm of mercury) and heart rate (bpm) during exercise

Parameter	Before procedure	After procedure	P <	In 15 min after procedure	Before proced. / in 15 min after procedure P<	After procedure. / in 15 min after procedure P<
BPS Experimental group	137,85 ±5,02	131,25 ±5,64	0,09	134,55 ±6,32	0,49	0,39
BPS Control group	132,15 ±4,75	133,65 ±4,50	0,60	132,90 ±4,23	0,78	0,81
BPD Experimental group	94,25 ±2,91	89,35 ±3,10	0,03	85,60 ±3,64	0,001	0,08
BPD Control group	87,65 ±3,49	91,40 ±3,11	0,01	89,75 ±3,22	0,18	0,21
HR Experimental group	86,00 ±3,74	91,95 ±4,47	0,12	88,80 ±4,17	0,49	0,40
HR Control group	89,75 ±3,43	98,35 ±1,95	0,06	91,60 ±3,28	0,64	0,002

Investigating effect of *Salvia Sclarea* L. EO, 0,5mg/m³ on cardiovascular system, initially values of BPS and BPD in both groups were normal by JNC6, but HR was higher. Certain difference of BP and HR values between control and experimental groups wasn't fixed (table 6).

After dance session without EO (control group) values of BPS and BPD didn't differ from initial data for certain, but HR had a significant rise.

In experimental group after dance session held in the room concentrated with *Salvia Sclarea* L. EO values of BPS didn't change, BPD had a tendency, HR rose significantly.

In 15 minutes after dance class BPS and BPD stayed as just after exercise in both groups, HR values reduced till initial marks.

Table 6

Effect of *Salvia Sclarea* L. EO, 0,5 mg/m³ on blood pressure (mm of mercury) and heart rate (bpm) during exercise

Parameter	Before procedure	After procedure	P <	In 15 min after procedure	Before proced. / in 15 min after procedure P<	After procedure. / in 15 min after procedure P<
1	2	3	4	5	6	7
BPS Experimental group	120,90 ±1,87	120,60 ±1,97	0,87	121,05 ±1,94	0,95	0,76
BPS Control group	126,25 ±3,73	129,10 ±4,50	0,43	126,25 ±3,49	1,00	0,34
BPD Experimental group	82,45 ±1,74	85,15 ±1,56	0,06	83,30 ±2,51	0,71	0,31
BPD Control group	83,25 ±2,54	85,70 ±1,28	0,14	85,45 ±2,05	0,15	0,86
HR Experimental group	85,90 ±3,30	96,70 ±3,15	0,0006	89,30 ±2,45	0,26	0,001
HR Control group	86,85 ±3,18	95,80 ±3,69	0,03	88,00 ±3,31	0,74	0,001

As a result it can be noticed that dances as they are provoke euphoric effect. Extra euphoric effect given by *Salvia Sclarea* L. EO reveals itself in case of the following study concentrations – 1,0 and 2,0 mg/m³.

Influence of *Salvia Sclarea* L. EO on cardiovascular system is significant in case of higher study concentrations – 1,0 and 2,0 mg/m³. Hypotensive and tachycardial effects are typical for it.

Therefore optimization of psychophysiological state of tested people determined by their psychoemotional state. Effect of *Salvia Sclarea* L. EO on cardiovascular system is varied.

Conclusions

1. *Salvia Sclarea* L. EO provokes emphasized euphoric effect, that is pronounced during prolonged and medium exercise load in case of the highest study concentration only – 1,0 and 2,0 mg/m³.

2. *Salvia Sclarea* L. EO possesses hypotensive and tachycardial effects having prolonged medium exercise load in case of the highest study concentrations – 1,0 and 2,0 mg/m³.

References

1. Osnovy psikhologii: Praktikum / Red. – sost. L.D. Stolyarenko. – Rostov-na-Donu: Pheniks, 2002. – 704 s.
2. Praktikum po psikhologii. / Pod red. A.N. Leontjeva, B. Hyppenreiter. – Izd. Mosk. Un-ta, 1972. – 248 s.

3. *Geun Hee Seol, Yun Hee Lee, Purum Kang, Ji Hye You, Mira Park, Sun Seek Min* Randomized Controlled Trial for *Salvia sclarea* or *Lavandula angustifolia*: Differential Effects on Blood Pressure in Female Patients with Urinary Incontinence Undergoing Urodynamic Examination // *J Altern Complement Med.* – 2013. 19(7). – July. – P. 664–670.

4. *Peana A.T., Moretti M.D.L.* Pharmacological activities and applications of *salvia sclarea* and *salvia desoleana* essential oils // *Studies in Natural Products Chemistry.* – 2002. - VoI. 26. – P. 391-398

5. *Pitarokili D, Couladis M, Petsikos-Panayotarou N, Tzakou O.* Composition and antifungal activity on soil-borne pathogens of the essential oil of *Salvia sclarea* from Greece // *J Agric Food Chem.* – 2002. – 50(23). – Nov 6. – P. 6688-6691.

6. *Seol GH, Shim HS, Kim PJ, Moon HK, Lee KH, Shim I, Suh SH, Min SS.* Antidepressant-like effect of *Salvia sclarea* is explained by modulation of dopamine activities in rats // *Ethnopharmacol.* – 2010. – 130(1). – Jul 6. – P. 187-90.

7. *Yang HJ, Kim KY, Kang P, Lee HS, Seol GH.* Effects of *Salvia sclarea* on chronic immobilization stress induced endothelial dysfunction in rats // *BMC Complement Altern Med.* – 2014. – Oct 14. – 14:396. doi: 10.1186/1472-6882-14-396.

The article was received at editors 26.10.2015

Bekmambetov T.R., Tonkovtseva V.V., Litvinchuk N.I., Yarosh A.M. Essential oil of *Salvia Sclarea* L. and its effect on psychophysiological state of people breathing it in different concentration during exercise // *Bull. of the State Nikit. Botan. Gard.* – 2015. – № 117. – P. 23-29.

Essential oil of *Salvia Sclarea* L. provokes euphoric effect during prolonged medium exercise; on the background of physical activity it is pronounced only in case of the highest study concentrations – 1,0 and 2,0 mg/m³. Essential oil of *Salvia Sclarea* L. possesses hypotensive and tachycardial effects as well.

Key words: *essential oil, Salvia Sclarea L., eastern dances, exercise load, psychoemotional state, WAM test, human psychophysiological state; nervous system; cardiovascular system.*

UDK 547.913:634.334:331.103.2:599.89

ESSENTIAL OIL OF *HELICHRYSUM ITALICUM* AND ITS EFFECT ON PSYCHOPHYSIOLOGICAL STATE OF ELDERLY PEOPLE BREATHING IT IN LOW CONCENTRATION

**Valentina Valeriyevna Tonkovtseva, Yelena Stanislavovna Koval,
Timur Rustemovich Bekmambetov, Aleksandr Mikhailovich Yarosh**

Nikita Botanical Gardens – National Scientific Centre
298648, Republic of the Crimea, the city of Yalta, urb.vil.Nikita
valyalta@rambler.ru

Introduction

Nevertheless essential oils (EO) are used extensively in aromatherapy, there are ones requiring more investigation [6]. Properties of *Helichrysum italicum* (Rhot) Guss. EO concerning central nervous system are to be examined more thoroughly. We held studies of its effect (1 mg/ m³) on human central nervous system before [5]. It was found out, that *Helichrysum italicum* mainly influences on psychological tone of body: improvement of well-being, rise of vivacity and attentiveness level and tension slowdown. Neuromotor process rate, velocity and accuracy of simple information processing (proof test), short-term memory, mood and anxiety parameters didn't try any effect of *Helichrysum italicum* EO [5].