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Essential oil of *Eucalyptus* 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. Effect of *Eucalyptus* essential oil on cardiovascular system is insignificant and varied.

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

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

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Introduction

Essential oil (EO) of *Syzygium Aromaticum* L. possesses neuroprotective, neurostimulating and tonic properties [5, 6]. It was demonstrated that breathing *Syzygium Aromaticum* L. EO of 1 mg/m³ during rest time, it improves general state, well-being, mood and reduces anxiety and tension level, strengthens sense of vivacity, elation and attentiveness. BPD reduction was not much but significant, HR tended to decrease [2].

Objective of this work is to investigate effect of *Syzygium Aromaticum* L. EO being in different concentrations on some functions of human central nervous system and cardiovascular system during exercise.

Objects and methods

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 *Syzygium Aromaticum* 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 [3, 4], 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 *Syzygium Aromaticum* L. EO, 2,0 mg/m³, and control group didn't have any significant differences (table 1).

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

Atmosphere concentrated with *Syzygium Aromaticum* L. EO provoked significant increasing of the most study parameters, besides capacity to work (tendency) and attentiveness. On the whole dance session held with *Syzygium Aromaticum* L. EO, 2,0 mg/m³, resulted improvement of psychoemotional state of tested people like it was in a control group. But changes were more pronounced than in experimental group.

Table 1
Effect of *Syzygium Aromaticum* 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<
General condition	151,60 ±6,60	150,50 ±6,56	163,00 ±5,48	0,004	155,40 ±5,30	0,09
Well-being	154,65 ±6,41	149,95 ±6,71	162,60 ±5,79	0,04	154,50 ±6,48	0,07
Mood	151,90 ±7,09	156,80 ±5,93	167,70 ±6,12	0,004	162,25 ±4,60	0,04
Weakness - capacity to work	140,80 ±5,83	146,75 ±6,86	154,65 ±5,96	0,06	143,50 ±6,35	0,60
Tension – relaxation	129,40 ±7,22	131,20 ±5,16	157,80 ±6,58	0,01	140,85 ±7,23	0,21
Inertness –vivacity	132,30 ±7,15	136,80 ±6,37	147,90 ±6,99	0,05	145,75 ±6,22	0,09
Absent-mindedness – attentiveness	138,50 ±6,75	137,10 ±6,33	144,00 ±6,79	0,43	139,50 ±4,96	0,65

According to WAM test initially experimental group having had a dance class in the room concentrated with *Syzygium Aromaticum* 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 well-being, mood, vivacity and general condition tended to increase.

After dance class in the room concentrated with *Syzygium Aromaticum* L. EO experimental group actually demonstrated significant improvement of all these parameters: general condition, well-being, mood, attentiveness; vivacity tended to rise while tension had a

tendency to slowdown.

On the whole dance session held in atmosphere concentrated with *Syzygium Aromaticum* L. EO, 1,0mg/m³ resulted significant improvement of psychoemotional state of test participants, as in a control group. In this way there was no marked difference between finite values of both groups.

Table 2

Effect of *Syzygium Aromaticum* 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<
General condition	145,20 ±5,31	144,00 ±6,52	156,20 ±5,85	0,005	153,20 ±4,91	0,10
Well-being	147,35 ±5,73	144,30 ±6,34	158,00 ±5,90	0,002	155,40 ±5,28	0,05
Mood	143,50 ±6,76	154,60 ±5,36	159,80 ±5,91	0,002	161,85 ±4,03	0,02
Weakness - capacity to work	137,20 ±6,73	141,55 ±5,99	148,00 ±5,78	0,12	148,45 ±5,55	0,29
Tension – relaxation	132,70 ±7,62	129,25 ±4,98	145,90 ±6,52	0,07	141,30 ±7,19	0,12
Inertness – vivacity	135,45 ±6,59	129,45 ±6,76	148,15 ±5,58	0,10	151,60 ±5,75	0,01
Absent-mindedness – attentiveness	126,60 ±5,12	134,30 ±5,99	139,90 ±4,74	0,03	141,85 ±4,59	0,26

Investigating effect of *Syzygium Aromaticum* L. EO of 0,5 mg/m³ according to WAM test, initially both groups didn't have any significant differences (table 3).

Table 3

Effect of *Syzygium Aromaticum* L. EO, 0,5 mg/m³, on psychoemotional state of tested people (test WAM 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	162,80 ±4,83	157,30 ±5,16	168,45 ±5,12	0,20	162,65 ±5,13	0,12
Well-being	157,85 ±5,71	157,50 ±4,93	169,15 ±5,77	0,03	164,85 ±4,54	0,02
Mood	164,50 ±4,23	166,35 ±4,37	174,30 5,13	0,06	169,95 ±3,37	0,13
Weakness –capacity to work	158,85 ±5,05	151,80 ±5,87	143,10 ±6,68	0,11	152,75 ±5,74	0,91
tension – relaxation	140,25 ±5,99	132,00 ±5,10	155,55 ±6,02	0,13	149,70 ±6,25	0,04
Inertness – vivacity	144,85 ±6,35	141,05 ±6,67	144,30 ±6,03	0,93	155,50 ±4,55	0,05
Absent-mindedness – attentiveness	143,90 ±6,13	144,30 ±5,65	141,85 ±5,01	0,63	144,80 ±4,14	0,94

After exercise without essential oil (control group) there was a significant rise of well-being, vivacity and slowdown of tension.

After dance session with essential oil (experimental group) positive changes were not

so pronounced as in control group: a significant improvement of well-being only, mood tended to rise.

While studying effect of *Syzygium Aromaticum* 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 normal by JNC6, HR – higher.

After dance session without EO (control group) values of BPS didn't change, BPD increased. In experimental group just after dance class with *Syzygium Aromaticum* L. EO BPS and BPD didn't change. In 15 minutes BPS and BPD were back to initial and just after dance values.

Value of HR in both groups rose for certain, 15 minutes later slowed down, but stayed a little bit higher.

Table 4

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

Parameter	Before procedure	After procedure	P b/a<	P in 15 min after procedure<	P before proced. / in 15 min after procedure <	P after procedure. / in 15 min after procedure P<
BPS Experimental group	129,50 ±4,57	126,95 ±3,00	0,41	126,50 ±3,47	0,22	0,85
BPS Control group	128,10 ±4,23	131,50 ±3,70	0,28	130,20 ±4,08	0,44	0,68
BPD Experimental group	82,15 ±3,19	82,70 ±2,73	0,84	83,10 ±2,61	0,17	0,21
BPD Control group	85,85 ±3,17	88,85 ±2,89	0,04	87,85 ±2,54	0,18	0,40
HR Experimental group	83,25 ±2,72	91,70 ±2,83	0,01	87,55 ±2,41	0,08	0,03
HR Control group	84,50 ±3,22	94,27 ±3,55	0,02	87,37 ±3,15	0,39	0,001

While studying effect of *Syzygium Aromaticum* L. EO, 1,0 mg/m³ on cardiovascular system it was found out that initially BPS and BPD in both groups were at high rate by JNC6, HR was higher. Certain differences between values of BP and HR weren't fixed either in control group or in experimental one (table 5).

After dance session without essential oil (control group) value of BPS didn't change, BPD tended to increase. In 15 minutes after dance class these values were on the same level as just after exercise.

In the experimental group after dance session in the room concentrated with *Syzygium Aromaticum* L. EO BPS decreased, while BPD was kept on the same level. In 15 minutes after dance class BPS value was the same as just after exercise, but lower in comparison with initial data. Values of BPD didn't differ much from initial and values just after dance class.

HR value just after dance increased and in 15 minutes it went down, but stayed higher a bit in comparison with initial data.

Table 5

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

Parameter	Before procedure	After procedure	P b/a<	P in 15 min after procedure <	P before proced. / in 15 min after procedure <	P after procedure. / in 15 min after procedure <
BPS Experimental group	140,20 ±5,67	124,35 ±3,76	0,0002	123,10 ±3,27	0,0001	0,63
BPS Control group	135,45 ±4,47	130,60 ±3,70	0,22	130,00 ±3,43	0,21	0,85
BPD Experimental group	89,10 ±3,22	90,25 ±3,07	0,65	86,80 ±3,02	0,17	0,21
BPD Control group	86,90 ±2,70	89,55 ±2,18	0,10	88,15 ±2,51	0,40	0,29
HR Experimental group	85,20 ±4,67	91,45 ±3,48	0,13	86,65 ±3,30	0,70	0,0003
HR Control group	89,75 ±3,37	94,25 ±3,43	0,17	85,65 ±2,52	0,12	0,0001

Investigating effect of *Syzygium Aromaticum* 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 differences of BP and HR values between control and experimental groups weren't fixed (table 6).

After dance session without EO (control group) values of BPS didn't differ from initial data for certain, but BPD had a significant rise. In experimental group after dance session held in the room concentrated with *Syzygium Aromaticum* L. EO values of BPS and BPD didn't change. In 15 minutes after dance class BPS stayed as just after exercise in both groups, BPD tended to decrease in a control group.

HR values after dance class increased significantly either in control or in experimental group. In 15 minutes HR in a control group decreased for certain, but in experimental group it was kept heightened in comparison with initial data.

Table 6

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

Parameter	Before procedure	After procedure	P b/a <	P in 15 min after procedure<	P before proced. / in 15 min after procedure <	P After procedure. / in 15 min after procedure <
1	2	3	4	5	6	7
BPS Experimental group	126,25 ±1,91	125,05 ±2,26	0,68	125,10 ±2,12	0,62	0,98
BPS Control group	127,95 ±4,15	131,20 ±3,84	0,33	128,60 ±3,67	0,84	0,47
BPD Experimental group	85,15 ±2,22	85,80 ±1,55	0,74	90,45 ±5,50	0,36	0,34
BPD Control group	83,60 ±2,87	87,40 ±2,39	0,03	86,80 ±2,26	0,06	0,58
HR Experimental group	81,90 ±3,57	94,65 ±3,20	0,00004	92,50 ±3,56	0,003	0,21
HR Control group	88,40 ±3,35	99,20 ±3,80	0,01	91,15 ±3,28	0,42	0,001

As a result it can be noticed that dance classes, as they are, provoke euphoric effect. Extra euphoric effect given by *Syzygium Aromaticum* L. EO reveals itself in case of the highest study concentration – 2,0 mg/m³.

Influence of *Syzygium Aromaticum* L. EO on cardiovascular system is significant in case of all study concentrations preventing BPD rise. If BPS is higher a bit (high rate by JNC6) EO demonstrates hypotensive effect. HR doesn't react to *Syzygium Aromaticum* L. EO.

Conclusions

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

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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.*

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

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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