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EFFECT OF *JUNIPERUS VIRGINIANA* AND *LAVANDULA ANGUSTIFOLIA* ESSENTIAL OIL COMPOSITION IN VARIOUS CONTENTS ON HUMAN PSYCHOEMOTIONAL STATE, MENTAL CAPACITY AND MEMORY

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Introduction

Essential oil (EO) of *Juniperus virginiana* L. (trade name is cedarwood oil) including such dominant elements as α - and β -cedren, cedrol, tuyopsen, has to be investigated much more concerning its effect on human than it had been done, though it's widespread in perfumery [2]. According to scientific experiments it was proved this EO content, 1,0 mg/m³, improves human psychoemotional condition and mental activity [1].

EO of *Lavandula angustifolia* Mill. has mainly the same effect on human as EO of *Juniperus virginiana* L. does, in spite of difference in their composition [1]. It founded the research of compositional oil effect of *Juniperus virginiana* L. and *Lavandula angustifolia* Mill. on human psychoemotional condition, mental activity and memory. This study was carried out having vapor concentration of this composition 1,0 mg/m³ and it was revealed that effects of the study composition and essential oils separately are close [1].

The study purpose is to investigate effect of the EO composition in various concentrations on human psychoemotional condition, mental activity and memory. Essential oils of *Juniperus virginiana* L. and *Lavandula angustifolia* Mill. are in equal proportions.

Objects and methods of the research

60 workers of locomotive depot at age of 20-60 years old participated in this research. They were divided into 3 groups, 20 people in each of them. Control group was a group of the same size and composition. Test people of the control group were left for 20 minutes resting and listening to the psychorelaxing record. Participants of the experimental groups were left in the same conditions during the same period but evaporation of EO composition in different concentrations was added.

For the first group concentration of EO volatile components in the air made 0,5 mg/m³, the second group – 1,0 mg/m³, the third – 2,0 mg/m³. Testing was conducted before and after procedures.

In assessment of EO influence on the nervous system it was used proofreading trial: "Landolt rings", WAM test (well-being, activity, mood), Spielberg test, memory test using 10 words,

simple complex sensomotor reactions [4, 5]. The data were processed using t Student's test for conjugate and independent sorting [3].

Results and discussions

According to dynamics of WAM test, EO composition of *Juniperus Virginiana L.* and *Lavandula angustifolia Mill.* has a positive effect on psychoemotional condition of test people in spite of its content (table 1). In the control group reliable dynamics wasn't registered.

General condition becomes better if the EO content makes 0,5 and 1,0 mg/m³; 2,0 mg/m³ keeps this tendency. Well-being improves under EO effect of 0,5 and 2,0 mg/m³ contents. Concentration of 1,0 mg/m³ didn't result any effect. Mood level rises under 0,5 and 2,0 mg/m³ contents, 1,0 mg/m³ keeps this tendency. Psychological tension considerably relieves under EO effect of all contents.

Table 1

Influence of *Juniperus Virginiana L.* and *Lavandula angustifolia Mill.* essential oil on psychoemotional human state. Contents 0,5-1,0-2,0 mg/m³ (parameters of WAM test, standard unit).

Parameter		Before procedure	After procedure	P b/a<
General condition	0,5 mg/m ³	134,92±9,16	160,10± 8,81	0,0001
	1,0 mg/m ³	144,65±7,63	157,25±6,77	0,02
	2,0 mg/m ³	133,10±6,82	147,30±6,56	0,06
	control	137,50±3,68	137,85±4,37	>0,1
Well-being	0,5 mg/m ³	145,58±8,96	159,00±8,71	0,0008
	1,0 mg/m ³	148,65±7,70	155,00±7,54	>0,1
	2,0 mg/m ³	147,95±8,04	163,04±7,12	0,05
	control	146,80±6,38	150,45±6,15	>0,1
Mood	0,5 mg/m ³	146,36±9,24	160,32±8,88	0,009
	1,0 mg/m ³	151,35±7,20	161,75±6,85	0,07
	2,0 mg/m ³	149,05±7,04	161,70±6,10	0,02
	control	148,40±7,14	154,95±7,55	>0,1
Tension– relief	0,5 mg/m ³	137,94±10,43	176,40± 9,13	0,0009
	1,0 mg/m ³	139,20±10,75	160,55±7,02	0,06
	2,0 mg/m ³	133,10±8,95	155,48±7,40	0,007
	control	135,15±5,84	142,75±3,76	>0,1

Situational anxiety was reliably decreased under effect of EO composition of *Virginiana L.* and *Lavandula angustifolia Mill.* in all contents, personal anxiety – 0,05 mg/m³ (table 2). In control group reliable dynamics wasn't marked out.

Table 2

Influence of *Juniperus Virginiana L.* and *Lavandula angustifolia Mill.* essential oil composition on situational and personal anxiety (Spilberg test). Contents 0,5-1,0-2,0 mg/m³

Parameter		Before procedure	After procedure	P b/a<
Situational anxiety, standard unit	0,5 mg/m ³	38,60±1,62	33,90±1,66	0,01
	1,0 mg/m ³	38,58±2,42	36,12±2,79	0,03
	2,0 mg/m ³	38,81±2,52	31,75±2,16	0,001
	control	38,90±0,83	37,90±1,03	>0,1
Personal anxiety, standard unit	0,5 mg/m ³	39,45±1,49	36,95±1,66	0,02
	1,0 mg/m ³	38,45±1,63	36,80±1,89	>0,1
	2,0 mg/m ³	38,95±2,42	36,80±2,56	>0,1
	control	39,40±0,47	37,90±1,25	>0,1

Effect of EO composition on people workability self-rating occurred, but not so considerable, than on self-rating of psychoemotional condition (table 3).

Table 3

Influence of EO composition of *Juniperus Virginiana* L. and *Lavandula angustifolia* Mill. on human workability self-rating (parameters of WAM test, standard unit). EO content – 0,5-1,0-2,0 mg/m³.

Parameter		Before procedure	After procedure	P b/a<
1		2	3	4
Weakness-capacity to work	0,5 mg/m ³	137,92±9,45	151,31±9,59	0,05
	1,0 mg/m ³	134,60±5,53	134,37±7,47	>0,1
	2,0 mg/m ³	138,64±9,78	150,17±8,42	>0,1
	control	140,15±5,68	146,85±5,72	>0,1
Weakness-vivacity	0,5 mg/m ³	144,84±9,35	158,18±10,28	0,04
	1,0 mg/m ³	147,80±8,09	151,30±9,45	>0,1
	2,0 mg/m ³	146,30±10,15	167,80±9,87	0,001
	control	142,30±7,62	149,60±7,24	>0,1
Absent-mindedness-attentiveness	0,5 mg/m ³	137,71±9,26	143,59±9,18	>0,1
	1,0 mg/m ³	137,31± 7,17	146,66±7,26	>0,1
	2,0 mg/m ³	135,20±9,32	152,10±9,05	0,0006
	control	139,00±4,83	143,00±6,92	>0,1

Reliable parameters were the following: increasing of workability self-rating (EO content – 0,05 mg/m³), vivacity (EO content – 0,05 and 2,0 mg/m³), attentiveness – 2,0 mg/m³.

Effect EO composition of *Juniperus Virginiana* L. and *Lavandula angustifolia* Mill. on the velocity of simple and complex sensomotor reactions (lightly slowdown) was registered only for 0,05 mg/m³ content (table 4).

Table 4

Influence of EO composition of *Juniperus Virginiana* L. and *Lavandula angustifolia* Mill. on velocity of simple (Tsimp) and complex (Tcomp.) sensomotor reactions and number of their mistakes (Msimp and Mcomp accordingly). Content of the EO composition– 0,5-1,0-2,0 mg/m³.

Parameter		Before procedure	After procedure	P b/a<
Tsimp, msec	0,5 mg/m ³	291,71±6,30	294,53±6,12	0,03
	1,0 mg/m ³	303,00±11,78	300,31±8,23	>0,1
	2,0 mg/m ³	285,46±10,06	285,69±8,24	>0,1
	control	297,28±2,89	296,35±5,80	>0,1
Msimp, units/test	0,5 mg/m ³	0,65±0,27	0,50±0,18	>0,1
	1,0 mg/m ³	0,60± 0,15	0,67±0,28	>0,1
	2,0 mg/m ³	0,58±0,16	0,38±0,14	>0,1
	control	0,55±0,15	0,70±0,23	>0,1
Tcomp, msec	0,5 mg/m ³	361,31±13,51	372,99±13,59	0,09
	1,0 mg/m ³	368,75±11,13	372,94±9,53	>0,1
	2,0 mg/m ³	352,40±9,57	357,76±9,85	>0,1
	control	362,83±1,87	363,80±9,67	>0,1
Mcomp, units/test	0,5 mg/m ³	0,70±0,21	0,65±0,20	>0,1
	1,0 mg/m ³	0,75±0,16	0,58±0,13	>0,1
	2,0 mg/m ³	0,75±0,16	0,46± 0,12	0,05
	control	0,80± 0,14	0,85±0,18	>0,1

At the same time the study EO composition increases volume of processed data and velocity of its processing (table 5). Reliable increasing of volume of processed information was registered with EO composition in content 1,0 mg/m³, velocity of information processing increases under effect of EO composition in content 0,5 mg/m³, the tendency keeps under 2,0 mg/m³.

Table 5

Influence of the EO composition of *Juniperus Virginiana* L. and *Lavandula angustifolia* Mill. on general volume of processed information (GVPI) and velocity of information processing (VIP) in proofreading trial (Landolt's rings). Content of the EO composition – 0,5-1,0-2,0 mg/m³.

Parameter	Before procedure	After procedure	P b/a<	
GVPI, bit	0,5 mg/m ³	150,25±3,18	153,20±2,37	>0,1
	1,0 mg/m ³	144,55±4,65	153,50±2,73	0,02
	2,0 mg/m ³	150,05±4,28	150,75±3,20	>0,1
	control	141,15±0,99	143,65±2,00	>0,1
VIP, bit/sec	0,5 mg/m ³	1,46±0,12	1,55±0,11	0,05
	1,0 mg/m ³	1,36±0,12	1,50±0,12	>0,1
	2,0 mg/m ³	1,64±0,16	1,77±0,14	0,10
	control	1,50±0,05	1,49±0,07	>0,1

Influence of the EO composition on short-term memory was revealed with its worsening (less number of memorized words): reliable parameter was under effect of the EO composition in content of 2,0 mg/m³ and this tendency keeps having EO composition content of 1,0 mg/m³ (table 6).

The EO composition didn't change short-term aural memory.

Table 6

Influence of the EO composition of *Juniperus Virginiana* L. and *Lavandula angustifolia* Mill. on short-term visual and aural memories (test 10 words, average number of memorized words). Content of the EO composition – 0,5-1,0-2,0 mg/m³.

Parameter	Before procedure	After procedure	P b/a<	
Short-term visual memory	0,5 mg/m ³	5,62±0,41	5,22±0,33	>0,1
	1,0 mg/m ³	6,04±0,34	5,38±0,23	0,08
	2,0 mg/m ³	6,30±0,29	5,67±0,31	0,05
	control	5,95±0,09	5,60±0,35	>0,1
Short-term aural memory	0,5 mg/m ³	4,95±0,25	4,90±0,25	>0,1
	1,0 mg/m ³	5,00±0,40	4,50±0,36	>0,1
	2,0 mg/m ³	5,08±0,37	4,95±0,32	>0,1
	control	4,95±0,14	5,10±0,32	>0,1

Therefore EO composition of *Juniperus Virginiana* L. and *Lavandula angustifolia* Mill. has an euphoric effect on psychological human condition almost in all study concentrations: improvement of general condition, mood, test people feel much better, decreasing of psychological tension and situational anxiety. Personal anxiety goes down only in case of the smallest EO composition content.

EO composition hardly effected on sensomotor reactions. There was only some acceleration of simple and complex sensomotor reactions under influence of the smallest content of the EO composition and decreasing of mistakes in the complex sensomotor reaction having the highest EO composition content.

Effect of the EO composition on workability self-rating of test people was registered as positive but not so expressed: some increasing of processed data volume and velocity of its processing without definite content dependence.

As to short-term memory EO composition had not so bright but selective (only visual memory) and worsening influence.

Conclusions

1. Dominant effect of the EO composition of *Juniperus Virginiana* L. and *Lavandula angustifolia* Mill. on human in all study contents of vapor in the air is euphoric.

2. Its influence on sensomotor reactions and mental activity was positive as well but not so bright.
3. Short-term visual memory became worse being effected by EO composition.

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Effect of *Juniperus virginiana* and *Lavandula angustifolia* essential oils composition (EOC) with contents of 0,5, 1,0 and 2,0 mg/m³ on human psychoemotional state, mental capacity and memory was the main objective of this research. In all study cases EOC effected euphorically on subjects, not so pronounced but positive effect on self-efficiency and its real state was marked, though short-term visual memory became worse a little.

Key words: *essential oils composition; Juniperus virginiana; Lavandula angustifolia; psychoemotional state; mental capacity; memory.*