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Dopamine quantity study in critical patients

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Dopamine is a neurotransmitter that is produced in the human and animal brain. Dopamine plays an important role in ensuring the cognitive function. Dopaminergic transmissions are necessary to switch attention from cognitive to other actions. The goal of the study was to define the quantity of dopamine in critical patients. The studies have revealed that dopamine concentration in critical patients are higher. Especially high concentration of dopamine in the blood was received from those patients which were on dopamine infusion. The concentration was also high in their liquor. The concentration of dopamine was high in children notwithstanding their health state that is in conformity with the references' data.

Key Words: Dopamine, Critical Patients, neurotransmitter

Introduction: Dopamine is a neurotransmitter, which is produced in the human and animal brain. This hormone is produced by brain substance of the adrenal gland and kidneys, but the dopamine produced here is not almost seen in the substance under cortex. According to the chemical structure, dopamine belongs to catecholamines and is a predecessor of noradrenaline. Dopamine is one of the chemical factors of inner hardening and is the important part of "compensation system" because it provokes the sense of satisfaction and thus influence the motivation and research processes. Dopamine normally is produced in large quantities in human subjective opinion during feeling positive emotions such as: sex, eating delicious food, pleasant emotions, using drugs, pleasant memories. That's why this neurotransmitter is used by the brain to evaluate motivation, to ensure species survival and reproduction process.

Actuality: Dopamine has an important role in provision of cognitive function. Dopaminergic transmissions are important in order to make humans switch attention from cognitive action to other actions. Thus, the deficiency of dopaminergic transmissions provokes the increase of inertness of a patient that is expressed clinically by slowdown of cognitive processes. Such disorders are typical for Parkinson diseases. (1.2.3.) Dopamine, like most number of neurotransmitters, has synthetic analogs and stimulators for its production in the brain. Namely, most drugs increase 5-10 times the production and release of dopamine in the brain. Amphetamine stimulates directly the release of dopamine rush. Other narcotics, like cocaine blocks the dopamine feedback loop because of which dopamine concentration in synaptic clefts. Morphium and nicotine imitate the action of natural neurotransmitters. Alcohol blocks dopamine antagonists. As a result of these processes chemical tolerance is developed gradually that provokes cerebral metabolic disorders and is a precondition of grave cerebral damages. Dopamine increases peripheral vascular resistance. At the expense of α -adenoreceptors stimulation it increases systolic arterial pressure and at the expense of β -adenoreceptors stimulation the number of heart rates is increased. (3.5) The goal of the study was to define the dopamine quantity in critical patients.

Materials and Methods: The study was performed on blood serum of 40 patients. Their age varied from 56 to 80 years. 25 of them were on artificial ventilation. The blood serum of 20 outpatients was taken as a control in different medical care institutions. Their age conformed to the age of critical patients. Besides, the study was performed on the blood serum of 10 children, being in hospital with

different pathologies. In addition during the study, the blood of 11 healthy adults was taken. *The study was performed according to the immunoenzyme technique by means of Dopamine ELISAFast Tracktest system (Labor Diagnostika Nord GmbH & Co. KG) the results were calculated by means of Raito immunoenzyme analyzer. The results have been processed statistically according to the statistical table of the student.*

Results and Discussion: Patients' distribution according to age, see table N 1

	Patients' age	Number	Artificial ventilation	Dopamine infusion
	56-65	4	1	1
	66-70	10	4	
	71-80	15	4	1
	81-90	11	4	1

Distribution according to diagnoses, see table N2

	Diagnosis	Number	Artificial ventilation	Dopamine infusion
	Hemorrhagic stroke	5	4	3
	Ischemic stroke	20	1	
	Pneumonia	10	4	
	Diabetes	5	4	

Results of dopamine concentration study, see table N3

Patients and healthy persons

№	Results		Deviation from the average		Standard deviation	
	B.1	B.2	B.1	B.2	B.1	B.2
1	120	80	-59.5	3.95	3540.25	15.6025
2	150	70	-29.5	-6.05	870.25	36.6025
3	180	60	0.5	-16.05	0.25	257.6025
4	200	120	20.5	43.95	420.25	1931.6025
5	160	50	-19.5	-26.05	380.25	678.6025
6	100	100	-79.5	23.95	6320.25	573.6025
7	90	50	-89.5	-26.05	8010.25	678.6025
8	80	100	-99.5	23.95	9900.25	573.6025

9	260 *	120	80.5	43.95	6480.25	1931.6025
10	320 *	80	140.5	3.95	19740.25	15.6025
11	720 *	70	540.5	-6.05	292140.25	36.6025
12	140	50	-39.5	-26.05	1560.25	678.6025
13	240	50	60.5	-26.05	3660.25	678.6025
14	120	50	-59.5	-26.05	3540.25	678.6025
15	100	40	-79.5	-36.05	6320.25	1299.6025
16	80	70	-99.5	-6.05	9900.25	36.6025
17	85	65	-94.5	-11.05	8930.25	122.1025
18	85	100	-94.5	23.95	8930.25	573.6025
19	160	120	-19.5	43.95	380.25	1931.6025
20	200		20.5		420.25	
Total	3590	1445	0	0.05	391445	12728.9475
Average	179.5	76.05				

* These patients were on artificial ventilation and the dopamine concentration in their cerebrospinal fluid was 120-150pg/ml.

t_{kp}	
$p \leq 0.05$	$p \leq 0.01$
2.03	2.72

Result: $t_{kp} = 3.1$

Critical value

As it is seen in the 3th table, dopamine concentration in the blood of critical patients is relatively high than in outpatients.

Across to the study above the dopamine concentration in 10 healthy adults was determined. The results are given in the table N4

Dopamine concentration in healthy persons, see tableN4

№	Results		Deviation from the average		Standard deviation	
	B.1	B.2	B.1	B.2	B.1	B.2
1	50	50	-13.4	-1.36	179.56	1.8496
2	50	60	-13.4	8.64	179.56	74.6496
3	30	84	-33.4	32.64	1115.56	1065.3696
4	150	52	86.6	0.64	7499.56	0.4096
5	25	23	-38.4	-28.36	1474.56	804.2896
6	37	45	-26.4	-6.36	696.96	40.4496
7	35	57	-28.4	5.64	806.56	31.8096
8	59	58	-4.4	6.64	19.36	44.0896
9	125	59	61.6	7.64	3794.56	58.3696
10	80	62	16.6	10.64	275.56	113.2096
11	130	15	66.6	-36.36	4435.56	1322.0496
Total	951	565	0.01	0.04	23881.6	3556.5456
Average	63.4	51.36				

Critical value

t_{kp}	
$p \leq 0.05$	$p \leq 0.01$
2.06	2.8

Result: $t_{kp} = 0.9$

$t_{kp} - 0.9$ this value is not an important result of difference.

As it is seen from the table above, the dopamine concentration in healthy persons was not beyond the normal value.

After that the comparison of dopamine concentration was made in healthy persons and children. The results are given in the table N5

Dopamine concentration in healthy persons and children

Table N5

№	Results		Deviation from the average		Standard deviation	
	B.1	B.2	B.1	B.2	B.1	B.2
1	50	150	-14.1	12.2	198.81	148.84
2	50	130	-14.1	-7.8	198.81	60.84
3	30	80	-34.1	-57.8	1162.81	3340.84
4	150	180	85.9	42.2	7378.81	1780.84
5	25	125	-39.1	-12.8	1528.81	163.84
6	37	130	-27.1	-7.8	734.41	60.84
7	35	130	-29.1	-7.8	846.81	60.84
8	59	125	-5.1	-12.8	26.01	163.84
9	125	128	60.9	-9.8	3708.81	96.04
10	80	200	15.9	62.2	252.81	3868.84
Total	641	1378	0	-0	16036.9	9745.6
Average	64.1	137.8				

Critical value

t_{kp}	
$p \leq 0.05$	$p \leq 0.01$
2.1	2.88

Result_{გა} = 4.4

Received t_{kp} **-4.4 belongs to reliable results.**

The table 5 reveals that dopamine concentration in children (notwithstanding their health situation) is much higher than in adults and t_{kp} **-4.4 is not the reliable result.**

Conclusion

The studies made clear that dopamine concentration in critical patients is much higher than in outpatients of the same age. This is not relevant to the data of the literature according to which the dopamine concentration in inert patients must be low. This may be caused by using sedative and analgesic medication. Especially high concentration of dopamine was found in the blood of the patients being on dopamine infusion. The concentration was high in their liquor as well that means local secretion of dopamine in the brain. In the control group of healthy donors the concentration of

dopamine was lower and within the standard range. The dopamine concentration was high in children notwithstanding their health situation that conforms to the data in literature.

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