

COMPARISON OF THE EFFECT OF CIGARETTE AND HOOKAH SMOKE ON THE BLOOD OF THE RATS

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Introduction. In the last years to the traditional ways of using tobacco in Ukraine - smoking cigarettes, cigars and smoking pipes - added and rapidly gaining popularity smoking hookah. The difference between the hookah and other methods of smoking tobacco products consists in the qualitatively different form of the disperse system, which enters the lungs of the smoker. If in cigarettes it is an aerosol of the smoke type, then in the hookah it is an aerosol of the fog type, where drops of water-glycerin mixture contain dissolved active substances. The result of this is the different influence of cigarette and hookah smoke on the smoker's organism.

The blood system is one of the most sensitive systems to toxic effect. As known the smoking may be the causes of hypoxia, which causes changes in the blood in the form of compensatory elevation of the erythrocytes and hemoglobin. At the same time, we have not come across any works devoted to the study of the effect on the blood system of nicotine and related substances from different dispersion systems.

Aim. Research the influence of the nicotine and related substances on the duration of bleeding, the count of erythrocytes and hemoglobin of the experimental animals which inhaling hookah or cigarette smoke.

Materials and Methods. Experiment was performed on 18 rats weighing 220 ± 30 g, divided into 3 groups of 6 animals each: 1st is an intact control, 2nd – the rats, exposed to cigarette smoke, 3rd – the rats, exposed to hookah smoke. The time of the experiment was 15 days. To simulate the process of passive smoking, a special plastic box volume of 8 m³ was used. Smoke delivery to the box was carried out within 30 minutes, by burning 4 cigarettes or 8 grams of hookah mixture, which corresponds to 0.043 mg of nicotine per day per rat. The level of hemoglobin was determined by the unified hemoglobincyanid method, which is based on the formation of colored cyanmethemoglobin. Extinction is measured on a photocolorimeter at a wavelength of 560 nm in a cuvette with a wall thickness of 1 cm. The number of erythrocytes was studied by colorimetric methods at a wavelength of 750 nm. The duration of bleeding from the microvessels was calculated by the Duke method (modified).

All intervention and euthanasia of animals was performed according to the requirements of the Commission on Bioethics of the National University of Pharmacy

(Kharkov, Ukraine) and "General ethical principles of experiments on animals", which are consistent with the provision of the European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes (Strasbourg, 1986) and the I-st National Congress on Bioethics (Kyiv, Ukraine, 2001).

Statistical analysis included material using standard methods of variation statistics, calculating average values (M) and the average error (m). Statistical significance was assessed using one-way ANOVA test, the difference was considered to be reliable at $p \leq 0.05$. The data processing was performed using Statistica 7.0 and Excel software.

Results and discussion. It was found that the time of spontaneous blood clotting after injury to the tail vein of the rat decreased in both experimental groups: decreased by 53 % under the influence of cigarette smoke ($p \leq 0.001$) and by 23 % under the influence of hookah smoke ($p = 0.06$). The time of blood coagulation against the background of cigarette smoke was 1.6 times less than under the influence of hookah ($p = 0.05$).

Also, there were changes in the red blood cell count and hemoglobin level at the rats of the 2nd experimental group. These indicators are higher than in the control group (table) by 1.2 % and by 10 %, respectively ($p \leq 0.05$). The rats of the 3rd experimental group showed no significant changes (table).

Table

Effect of cigarette and hookah smoke on blood parameters in rats

($X \pm S_x, n = 6$)

Groups / indicators	Red blood cells, $10^{12}/l$	Hemoglobin, g / l
1 st group	5.16±0.09	110.92±3.50
2 nd group	5.22±0.10	121.51±4.37
3 rd group	5.15±0.19	111.47±2.32

Based on the study of the blood has been determined that against the background of exposure to cigarette smoke for 15 days there is a tension of hemopoiesis caused by hypoxia, which occurs in the conditions of cigarette smoking.

Conclusions.

1. It has been established that against the background of the influence of both cigarette and hookah smoke, the blood clotting time in the rats of both experimental groups decreases.

2. Cigarette smoke has the greatest influence on the blood clotting time, the red blood cells count and the level of hemoglobin.