MORPHOMETRIC CHARACTERISTIC OF MICROCIRCULAR RATE OF SALIVARY GLANDS AFTER ADMINISTRATION OF PLATYPHYLLINUM AND PROSERINUM

Dr. **Yeroshenko G.A.**
E-mail: gala_umsa@mail.ru

Tsukanov D.V.
E-mail: tsuk_dima@mail.ru

Dr. Gasiuk N.V.
E-mail: gasyuk.natasha@mail.ru

Dr. Chernyak V.V.
E-mail: val35@rambler.ru

Department of Histology, Cytology and Embryology,
Higher State Educational Establishment of Ukraine "Ukrainian Medical Stomatological Academy",
23 Shevchenko Str., Poltava, 36011, Ukraine

Corresponding Author:
Dr. Yeroshenko Galina Anatoliyevna , MD, PhD in Medical Sciences, Professor,
Department of Histology, Cytology and Embryology,
Higher State Educational Establishment of Ukraine
"Ukrainian Medical Stomatological Academy",
23 Shevchenko Str., Poltava, 36011, Ukraine
E-mail: gala_umsa@mail.ru

ABSTRACT

Salivary glands are important organs, which ensure oral cavity homeostasis. In contemporary clinical practice treatment of salivary dysfunction, in most cases, is limited due to the lack of evidence as for increase in salivation due to drugs that are taken to stimulate the salivary secretion.

The purpose of the research was to estimate changes in metric values and capacitive levels of blood microcirculation of the salivary glands under the effect of Platyphyllinum and Proserinum.

Morphometric study showed that administration of Platyphyllinum and Proserinum to experimental animals causes similar changes in metabolic and capacitive components of blood microcirculation stream of salivary glands. They are manifested through the increased rates mostly in administration of Proserinum. Microvessels of submandibular gland were the most dilated; the least dilated were microvessels of the parotid gland. The specific feature of hemomicrovessels of sublingual gland was the absence of significant difference between the rates in experimental groups of animals.

Key words: salivary glands, Proserinum, Platyphyllinum, microvessels, morphometry.

INTRODUCTION

Salivary glands play a significant role in maintaining homeostasis in the oral cavity. Some systemic diseases and lesions of salivary glands are accompanied by complaints of xerostomia [8-10].

Sufficient salivation in patients can be achieved mechanically or pharmacologically by the salivary glands stimulation [11]. Presently, however, treatment of salivary dysfunction is limited due to few randomized clinical trials and, in most cases, lack of evidence as for increase in salivation while taking the drugs, used in contemporary clinical practice to stimulate salivary secretion [7, 12].

Organ's response to stimulation is possible in the availability of structures, sensitive to this particular stimulus [3]. Administration of Proserinum and Platyphyllinum to experimental animals evokes structural changes in glandular components of salivary glands [2]. Manifestation of these changes is multiple, as well as multiple are signs from the side of blood vessels, acine and excretory ducts [1].

PURPOSE

The research was aimed at the estimation of changes in metric values of metabolic and capacitive components of blood microcirculation stream of salivary glands under the effect of Platyphyllinum and Proserinum.

MATERIALS AND METHODS

The trial has been carried out on 25 white outbreed rats, weighting 180-200 g. The animals were assigned to 3 groups: 5 animals (the control group) were administered with 2,5 ml isotonic NaCl solution intraarterially drop-by-drop (to exclude the influence of water load in the comparison group); 10 animals were administered with 0,3 mg/kg Platyphyllinum (Darnitsa), diluted with isotonic solution, intraarterially drop-by-drop; 10 animals were administered with 0,1 mg/kg Proserinum (Darnitsa), diluted with isotonic solution, intraarterially drop-by-drop.

The animals were killed under thiopental anesthesia overdose. Pieces of greater salivary glands were put into epon- 812 according to conventional technique. The obtained blocks were sectioned into semithin slices, stained with polychrome stain and studied in the light microscope. Morphometric parameters, i.e., lumen diameter of capillaries, postcapillary venules and venules of the lobules of salivary glands, has been measured by means of microscope with digital Biorex 3 microphotohead (serial umber 8M - 500 T) with c DCM 900 digital camera with software programs, adapted to these studies.

Quantitative analysis of findings of morphometric study and statistical processing of morphometric data has been carried out according to conventional statistical methods, using Microsoft Excel [5].

Animal housing and experiments on them have been carried out in compliance with the "General Ethic Rules for Conducting Experiments on Animals", corresponding Law of Ukraine "For the Protection of Pet Animals" (No.3446-IV, 21.02.2006, Kyiv) and the requirements of international principles of the "European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes"[6].

RESULTS AND DISCUSSION

Complex estimation of morphometry data of metabolic and capacitive components of blood microcirculation stream of lobules of salivary glands showed that administration of Platyphyllinum and Proserinum significantly influenced on the values of average lumen diameter of capillaries, postcapillaries and venules in lobules of parotid glands in rats.

In administration of Platyphyllinum the average lumen diameter of capillaries was significantly ($p < 0,05$, in comparison with control group) enlarged by 79,4%; the average lumen diameter of postcapillaries was significantly ($p < 0,05$, in comparison with values in control group) enlarged by 27,6%; and the average lumen diameter of venules was significantly ($p < 0,05$, in comparison with control group) enlarged by 22,2%.

The average metric values of lumen diameter of capillaries, postcapillaries and venules in rats, administered with Proserinum, were significantly grater than values in control group of animals ($p < 0,05$). In administration of Proserinum the average lumen diameter of capillaries was significantly ($p < 0,05$, in comparison with control group) enlarged by 55,9%; the average lumen diameter of postcapillaries was significantly ($p < 0,05$, in comparison with control group) enlarged by 39,4%; and the average lumen diameter of venules was significantly ($p < 0,05$, in comparison with control group) enlarged by 12,3%.

No significant differences as for the average lumen diameter of capillaries in the II experimental group, in comparison with the I experimental group have been found.

Though the average lumen diameter of postcapillaries and venules in the I experimental group was larger than in the control one ($p < 0,05$), the average lumen diameter of capillaries, postcapillaries and venules was smaller by 13,1%, 18,6% and 9,2%, respectively, in comparison with the II group of animals (Table 1).

Table 1: Average diameter values of metabolic and capacitive components of hemomicrocirculation stream of lobules of parotid gland in rats (mcm)

Parameters	Capillaries	Postcapillaries	Venules
Control (n=5)	3,4±0,06	7,6±0,05	16,2±0,14
Administration of Platyphyllinum (n=10)	6,1±0,68 *	9,7±0,51 *	19,8±0,75 *
Administration of Proserinum (n=10)	5,3±0,12 *	7,9±0,17 *, **	18,2±0,24 *, **

Note: * - $p < 0,05$ in comparison with control group; ** - $p < 0,05$ in comparison with experimental group.

Similarly, the components of blood microcirculation stream of lobules of submandibular glands responded to stimulation by enlargement of the average lumen diameters, in comparison with control group of animals.

In administration of Platyphyllinum the average lumen diameter of capillaries was significantly ($p < 0,05$, in comparison with control group) enlarged by 225,7%. In administration of Proserinum the rates of average lumen diameter of capillaries increased by 120,9%. However, they were 147,4% lower ($p < 0,05$), in comparison with the I experimental group of animals.

In administration of Platyphyllinum the rates of average lumen diameter of postcapillaries of lobules of submandibular glands were significantly ($p < 0,05$, in comparison with control group) increased by 95,1%. In administration of Proserinum the rates of average diameter of postcapillaries lumen increased by 79,1%. The significant difference ($p < 0,05$), indicating the predominance of average rates of diameter of postcapillaries lumen by 9% in the I experimental group has been found while comparing the obtained metric data between experimental groups of animals.

In administration of Platyphyllinum the average lumen diameter of venules was significantly ($p < 0,05$, in comparison with control group) enlarged by 111,1%. In administration of Proserinum this metric value was also higher ($p < 0,05$, in comparison with control group) by 117,9%. It should be admitted that no significant difference between average rates of average lumen diameter of venules ($p < 0,05$) has been found while comparing the obtained data between the experimental groups of rats (Table 2).

Table 2: Average diameter values of metabolic and capacitive components of hemomicrocirculation stream of lobules of submandibular gland in rats (mcm)

Parameters	Capillaries	Postcapillaries	Venules
Control (n=5)	3,15±0,04	7,69±0,08	12,91±0,42
Administration of Platyphyllinum (n=10)	10,26±0,75 *,**	15,01±0,44 *,**	27,25±1,03 *
Administration of Proserinum (n=10)	6,96±0,56 *,**	13,77±0,44 *,**	28,13±0,89 *

Note: * - $p < 0,05$ in comparison with control group; ** - $p < 0,05$ in comparison with experimental group.

The average rates of lumen diameters of components of blood microcirculation stream of lobules of sublingual glands increased in all experimental groups.

In administration of Platyphyllinum the average lumen diameter of capillaries was significantly ($p < 0,05$, in comparison with control group) enlarged by 72,6%. In administration of Proserinum the average rates of lumen diameter of capillaries increased by 81,8%. No significant differences of studied rate have been found between the experimental groups of animals.

In administration of Platyphyllinum the average lumen diameter of postcapillaries was significantly ($p < 0,05$, in comparison with control group) enlarged by 37,3%, and in administration of Proserinum by 42,4%. However, no significant difference of metric values ($p < 0,05$) has been found between the experimental groups of rats.

In administration of Platyphyllinum the average lumen diameter of venules was significantly ($p < 0,05$, in comparison with control group) enlarged by 16,8%. In administration of Proserinum the average lumen diameter of venules was significantly ($p < 0,05$, in comparison with control group) enlarged by 66,6% (Table 3).

Table 3: Average diameter values of metabolic and capacitive components of hemomicrocirculation stream of lobules of sublingual gland in rats (mcm)

Parameters	Capillaries	Postcapillaries	Venules
Control (n=5)	4,57±0,04	9,74±0,08	13,89±0,12
Administration of Platyphyllinum (n=10)	7,89±0,73 *	13,37±0,4 *	16,22±0,74 *,**
Administration of Proserinum (n=10)	8,31±0,56 *	13,87±0,73 *	23,14±0,97 *,**

Note: * - $p < 0,05$ in comparison with control group; ** - $p < 0,05$ in comparison with experimental group.

CONCLUSION

Administration of Platyphyllinum and Proserinum to experimental animals causes similar changes in metabolic and capacitive components of blood microcirculation stream of lobules of greater salivary glands, which are manifested through the increase of rates with values prevailing in administration of Proserinum. The most pronounced dilatation of microvessels has been detected in submandibular gland, and the least one in the parotid gland. The specific characteristic of response of hemomicrovessels of lobules of sublingual gland was the absence of significant differencethe between rates in experimental groups of animals.

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