ASSESSMENT OF MORPHOLOGICAL CHANGES IN THE THYROID GLAND BY TEST-POINT METHOD WITH THE INTRODUCTION OF DIPSACOSIDE

A. Don¹, S. Nagai², D. Sadikova¹
¹Tashkent State Dental Institute, Tashkent, Uzbekistan, 00000, Makhtumkuli. 103
²Uchtepa Interdistrict Expert Commission, Tashkent, Uzbekistan, 100011, Nurafoshon, 9/5

¹Andrey Don - PhD in medicine, assistant of the Physiology and Pathology Department of Tashkent State Dental Institute, 100000, Tashkent, 103 Makhtumkuli str., E-mail: Andrey Don andrey.don.60@inbox.ru, +998 97 433 45 90, ORCID: 0000-0002-3140-2278
²Saveliy Nagai - PhD in medicine, medical examiner of the Uchtepa Inter-District Commission.
³Diyora Sadikova - 3rd year medical student of Tashkent State Dental Institute.

The search for herbal medicines for the treatment and prevention of atherosclerosis remains the most important problem of modern medicine. Dipsacoside is one of these drugs, it is the sum of triterpene glycosides, obtained in the laboratory of pharmacognosy of the Institute of Biopharmacology of the Academy of Sciences of Kyrgyzstan M.M. Mukhamedziev (head of the laboratory - Ph.D. P.K. Alimbaeva). The results of the experimental study showed changes in structural parameters indicating an increasing morphological and functional activity of the thyroid gland under the influence of daily oral administration of an aqueous solution of dipsakozide at a dose of 10 mg/kg of animal weight.

Keywords: atherosclerosis, dipsaccoside, morphometry, thyroid gland.
Атеросклерозы емдеу және алдың алу үшін әуядың жасалған дәрілірді іздеу құралған. Дипсакозид осы препараттардың бірі болып табылады, ол тритерпен гликозидтерінің қосындысы Қырғызстан Ғылым Академиясының Биофамакология институтының фармакогнозия зертханасында М.М. Мұхамедзең алынған.  Эксперименттік зерттеу нәтижелері мал салмағына 10 мг/кг дозада дипсакозидтің су ерітіндісін күнделікті ішке қабылдау әсерінен қалқанша безің морфофункционалды бейнеден салынатын құрылымдық параметрлердің өзгеруін көрсөтті.

Түйінді сөздер: атеросклероз, дипсакозид, морфометрия, қалқанша безі.

The Author for correspondence: Don Andrey Nikolayevich, PhD in medicine, assistant of the Physiology and Pathology Department of Tashkent State Dental Institute, 100000, Tashkent, 103 Makhtumkuli str. Mobile phone: +998 97 433 45 90, E-mail: Andrey Don andrey.don.60@inbox.ru

Received: 24.05.2022
Accepted: 27.06.2022


Relevance
Atherosclerosis, through its main manifestations in the form of cardiovascular diseases, remains the leading cause of death in the world's population. Uzbekistan is not an exception. The problems of morbidity and mortality from cardiovascular diseases were drawn to the attention of the President of Uzbekistan Sh.M. Mirziyoyev at a videoconference meeting held on November 9, 2021 and dedicated specifically to the issues of morbidity and mortality of the country's population from this pathology, which reached 53% of total mortality. The timeliness and relevance of researchers to this topic is beyond doubt.

It should be noted that a very important task of medicine is the search for herbal remedies with anti-atherosclerotic and lipid-lowering properties. Phytotherapy has always taken its place in the list of medicines. To date, there is no doubt about the benefits of herbal medicinal substances. This is low toxicity, allergenicity, the possibility of using for a long time [1-3].

In addition, there is an opinion that, being organic substances, phytopreparations are successfully integrated into the metabolic processes of the body, while providing their therapeutic effects [1]. Dipsacoside is one of these drugs, it is the sum of triterpene glycosides, obtained in the laboratory of Pharmacognosy of the Institute of Biopharmacology the Academy of Sciences of the Kyrgyz Republic by M.M. Mukhamedzieva under the guidance of head of the laboratory - Ph.D. Alimbaeva P.K.

Purpose of the study
The conducted studies revealed a noticeable hypolipidemic and anti-atherosclerotic effect of dipsakoide. Taking into account the role of the endocrine system in general, and the participation of the thyroid gland, in particular, in the pathogenesis of atherosclerosis, the aim of this work was to study the possible mediated action of the drug dipsakoide through the thyroid gland.
Materials and methods

The work was carried out on 40 mature outbred males with an initial weight of 2.1-3.0 kg by the beginning of the experiment. Animals were divided into 2 groups. 30 animals of the 1st group received an aqueous solution of dipsakozide orally at the rate of 10 mg/kg of weight, 10 animals in groups of 30, 60 and 90 days of the experiment. 10 intact animals made up the control. The experiments were carried out in the autumn-winter period under conditions of artificial lighting with a day length of 10 hours. Micropreparations were prepared from the thyroid glands using standard technology. The functional morphology of the thyroid gland was assessed using morphometric analysis by the test-point stereological method proposed by Avtandilov G.G. [4], which includes such indicators as relative volume percentages of intrafollicular colloid, follicular and interfollicular epithelium, and organ stroma [5-7]. This method of morphometry allows to track the processes in the norm and pathology, which makes it a unique tool for morphophysiological analysis [8-12].

Results and discussion

In animals of the control group, qualitative and quantitative indicators indicated the typical normal structure of the thyroid gland described for the region. At the same time, the relative volume of the intrafollicular colloid was 50.16±2.07%, the volume of the follicular epithelium - 21.04±0.68%, the volume of the interfollicular epithelium - 21.76±1.74% and the stroma of the organ - 6.96± 0.68%. In the animals of the experimental group, in the qualitative characteristics of the organ on the 30th day of the experiment, a decrease in the diameter of the follicles was noted, the intrafollicular colloid looked liquefied, scalloped edges were visible, areas with "foamed" colloid were determined. The volume of the intrafollicular epithelium was 40.64±3.32%, the volume of the follicular epithelium was 24.48±1.03%, the volume of the interfollicular epithelium was 29.52±3.49%, the volume of the stroma was 5.36±0.55%.

In comparison with animals of the control group, after 60 days of experience in experimental rabbits, an increase in the values of indicators was noted, the rise of which indicates an increase in the morphofunctional activity of the gland. We are talking about such an indicator as the average percentage of the proportion of follicular epithelium, which amounted to 23.28 ± 1.67%. At the same time, there was also a statistically significant decrease in those that indicate a similar direction of the process - the average percentage of the colloid fraction was 31.96±4.6%. The volume fraction of the interfollicular epithelium increased sharply to 36.6±4.14%, which indicates an increased proliferation of the epithelium of typical thyrocytes and active neoplasm of follicles. The structural proportion of the thyroid stroma also increased and was equal to 8.16±1.17%.

The increase in the duration of the experiment up to 90 days was accompanied by the following manifestation of the changes described above. The volume fraction of intrafollicular colloid was 33.16±5.21%, the volume fraction of follicular epithelium was 22.8±1.14%, interfollicular epithelium - 37.72±5.62% and stroma - 6.32±0.86 %.

Turning to the discussion of the results obtained, it should be noted that the volume fraction of the colloid, in comparison with the control, decreased during all periods of the experiment, which indicates its mobilization into the bloodstream with the manifestation of an increase in the morphophysiological activity of the thyroid gland.

Speaking about the volume fraction of the follicular epithelium, it is worth paying attention to the higher values of this indicator in the animals of the experimental group. It is noteworthy that the greatest value takes place in the group of animals treated with dipsacoside for 30 days, with a subsequent decrease in the value of the indicator by the end of the experiment, while remaining greater than the same indicator in the control.

The results obtained in this part can be interpreted as follows, at 30 days of the experiment there is a significant increase in the proportion, followed by a slight decrease in the value at 60 and 90 days of the experiment, which can be explained by the adaptive processes of follicular epithelial cells to the action of the drug.

An increase in the volume fraction of the interfollicular epithelium as the duration of the experiment increases indicates an increase in the processes of proliferation of the follicular
epithelium and active neoplasm of follicles. This trend persisted throughout the experiment. The structural proportion of the stroma of the thyroid gland also increased and was higher than the quantitative indicators of animals in the control group. It is noteworthy that the maximum values fall on the period of 60 days, which reflects the maximum response of the stromal component to the administration of dipsakoside with the leveling of the indicator with the control values at the end of the experiment.

To a large extent, the stroma is represented by vessels, as a result, an increase in the volume fraction occurs mainly due to the plethora of blood vessels, which, in turn, is a documenting fact of an increase in metabolic processes in the organ and an increase in its morphofunctional activity.

Conclusion

The use of the test-point method of morphometry made it possible to obtain reliable information that the daily oral administration of an aqueous solution of dipsakoside at a rate of 10 mg/kg of animal weight leads to a change in structural parameters indicating an increasing morphofunctional activity of the thyroid gland. We are talking about such indicators as the relative volume percentages of intrafollicular colloid, follicular and interfollicular epithelium, as well as the stroma of the organ. Changes in the values of the studied parameters are clearly detected on the 30th day, it is even more clearly visible on the 60th and 90th days of the experiment.

It should also be noted that the use of the test-point method, which is very common in morphometry, along with other morphometric methods, in the study of changes in the thyroid gland, makes it possible to more accurately quantify the nature of the structural rearrangement and the degree of morphofunctional activity, which has not only theoretical, but also practical value in such research work.

Another advantage of this method is its accessibility for researchers. It is necessary to agree with the opinion of one of its founders [6] that test-point morphometry is a rather laborious process, but this is compensated by the results obtained, which allow expanding the possibilities of morphology in obtaining more in-depth results in assessing the morphofunctional status of the organs under study.

Bibliography


