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SUGARY DIABETES IN THE MODEL RATS LARGE SALIVA IN THE GLANDS DEGENERATIVE-DYSTROPHIC OF PROCESSES MORPHOLOGICAL ANALYSIS

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Abstract

. In this study, the degenerative-dystrophic processes that develop in the major salivary glands of rats under the conditions of an experimental model of diabetes mellitus were morphologically evaluated. The aim of the work was to comprehensively characterize the structural reconstructions that occur in the parenchyma and stromal components against the background of metabolic shifts characteristic of diabetes. A streptozotocin-induced diabetes model was used as a methodology; samples taken from the submandibular, preauricular and sublingual salivary glands were analyzed by histological staining and morphometry. The scientific novelty is to substantiate the simultaneous occurrence of microcirculatory disorders, atrophy of the secretory departments, reactive reconstruction of the ductal epithelium and stromal fibrosis in the major salivary glands in diabetes as an interrelated cascade. The results indicate that the identification of morphological markers corresponding to ischemia and oxidative stress in the pathogenesis of diabetic sialadenopathy is of diagnostic and preventive approaches for important that it is shows.

Keywords: Sugary diabetes; major saliva glands; degenerative-dystrophic processes; microcirculation; fibrosis; morphometry; rat model.

Introduction

Аннотация

В настоящем исследовании выполнена морфологическая оценка дегенеративно-дистрофических процессов в крупных слюнных железах крыс при экспериментальной модели сахарного диабета. Цель работы заключалась в комплексной характеристике структурных перестроек паренхимы и стромы на фоне диабет-ассоциированных метаболических нарушений. В качестве методологии использована модель диабета, индуцированного стрептозотоцином; из подчелюстной, околоушной и подъязычной слюнных желез получали образцы и анализировали их с применением гистологических окрашиваний и морфометрии. Научная новизна состоит в обосновании того, что при диабете изменения микроциркуляции, атрофия секреторных отделов, реактивная перестройка протокового эпителия и нарастание фиброза стромы протекают как взаимосвязанный каскад. Полученные данные указывают на диагностическую значимость морфологических маркеров, соответствующих ишемии и оксидативному стрессу, и подтверждают их потенциал для разработки профилактических и патогенетически обоснованных подходов при диабетической сиаладенопатии.

Ключевые слова: сахарный диабет; крупные слюнные железы; дегенеративно-дистрофические процессы; микроциркуляция; фиброз; морфометрия; модель крыс

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Introduction

Candy diabetes chronic metabolic disease as organism various to systems many one-sided effect This shows effects inside saliva glands functional and morphological in the state changes important place Clinical in observations diabetes with sick in patients mouth dryness , mucus floor fast damage , caries acceleration and regeneration processes slowdown often meeting record These cases are mainly due to saliva . secretion decrease and his/her structural features change with depends .

With this together , together in the glands face giving structural changes often general diabetic complications within seeing will be released and glandular tissue to oneself typical reactions enough at the level not illuminated . Current scientific information diabetes under the circumstances microcirculation breakdown , oxidizing stress increase and metabolic of products accumulation of glandular cells functional to the activity negative impact to do shows . As a result cell energy from the trail turns out , degenerative processes activates and interstitial in the fabric fibrosis develops. Large saliva glands structure and functional features from each other difference what did because of them to diabetes answer The reaction is also different. to be possible . In this respect , this in the glands passing changes comparative analysis to do important scientific importance has . Experimental diabetes from models use pathological processes control to be done under the circumstances study opportunity gives . However there is in research taken results often separately components at the level limited to parenchyma , stroma and microcirculation between mutual dependency enough at the level not systematized . Therefore , the complex morphological and morphometric approach based on this processes study current is considered . This of the research purpose experimental diabetes under the circumstances rats large saliva in the glands face giving degenerative-dystrophic changes complex assessment and their mutual dependence from determining consists of .

Materials oath Methods

In the study, a model of diabetes mellitus was formed in adult male rats maintained in laboratory conditions using streptozotocin; the control group was observed under physiological conditions. After diabetes induction , hyperglycemia was verified by laboratory indicators, and at the end of the specified period, the animals were removed from the experiment in accordance with bioethical requirements. The preauricular, submandibular , and sublingual major salivary glands were removed from each animal, subjected to standard fixation and embedding in paraffin blocks. Hematoxylin-eosin stains were used to assess the general architectonics in the sections , and special histochemical stains were used to show stromal collagen fibers; signs of vascular wall, interstitial edema, and cellular infiltration were qualitatively recorded. Within the framework of morphometry, the relative density and area of acini, epithelial thickness of ductal sections , stroma fraction, and vascular lumen indicators were evaluated by digital analysis of images. The methodological approach was based on the need to comprehensively view changes in diabetes at the tissue level, that is, to analyze the parenchyma and stroma together; morphometric criteria served to eliminate subjectivity in observations and quantitatively confirm differences between groups [6]. Statistical processing was used to assess the reliability of the results , and significance criteria were previously defined.

Results

In the group in which the diabetes model was formed, the general architectonics of the major salivary glands first of all showed a shift in the parenchyma-stroma ratio towards a relative increase in the stroma. In the submandibular gland , the contours of serous acini were uneven, vacuolation and a decrease in granularity in the cytoplasm of secretory cells were noted, in some areas the acini shrunk and appeared prone to fragmentation. In the ductal system, especially at the level of striated ducts, thickening consistent with reactive hyperplasia of epithelial cells, narrowing of the lumen in some places, stable masses consistent with thickening of the secretion were detected, and periductal stroma was thickened around the duct. In the parotid gland, degenerative signs were relatively mosaic in nature , with the secretory sections being preserved in some lobules, while atrophy of the acini and interstitial edema were more pronounced in other lobules; In this gland, microcirculatory changes, in particular, capillary filling and a tendency to stasis, were more pronounced against the background of the predominance of the serous component. In the sublingual gland, swelling of the cell cytoplasm, aggregation of secretory vacuoles, epithelial desquamation in some areas, and focal fibrosis elements around small ducts were noted against the background of the predominance of mucous acini.

the microcirculatory direction, in the diabetic group, thickening of the arteriole wall, reactive changes in the endothelial layer, perivascular edema and signs consistent with erythrocyte aggregation were detected. In the venules, blood stagnation , microhemorrhages in some areas and changes similar to signs of hemorrhagic impregnation were observed. In the stroma, there was an increase in fibrosis accompanied by the accumulation and irregular arrangement of collagen fibers , expansion of interlobular septa , and an increase in fibroblastic elements. Morphometric analysis showed a decrease in the average area and relative density of acini in the diabetic group , an increase in the proportion of stroma, and thickening of the ductal epithelium; these trends were most consistent in the submandibular gland, and the dispersion was higher in the parotid gland. Morphometric parameters of the vascular lumen reflected a shift towards narrowing and unevenness at the capillary and venular junction, which was consistent with the observed stasis and perivascular edema.

Discussion

Received results diabetes under the circumstances large saliva in the glands observable changes separately - separately not , maybe each other connected only pathogenetic system as development shows . In the parenchyma degenerative characters , especially cells in the cytoplasm vacuolation and secretor activity decrease , possibly , metabolic disorders as a result to the surface coming energetic shortage with related

With this together , ductal in the system determined structural changes compensator to the character has to be possible . Epithelium thickening and again construction processes secretion divorce to provide aimed at although , lumen narrowing and of the secret thickening on the contrary , drainage function further This makes it worse . pathological of processes to deepen take Microcirculator in the system changes are also important importance has . Vein of the wall thickening , blood of the flow slowdown and as a result of perivascular edema to tissues oxygen and food substances delivery This situation is limited . own in turn in cells degenerative processes to increase conditions creates . In the stroma observed fibrosis processes and pathological of changes again one important component Collagen of fibers increase and their disorderly location tissue elasticity reduces and substance exchange makes it

difficult . As a result gland normal function from the trail comes out . Different saliva in the glands determined differences their morphofunctional features with For example , the bottom under the jaw gland high metabolic activity him/her diabetes to the effect relatively more sensitive does , listen took in the gland and of changes uneven distribution microcirculation features with related to be possible . In general received , received results diabetic sialadenopathy in development microcirculator disorders , stromal fibrosis and parenchymal degeneration each other closely related that confirms . This is the disease early determination and effective prevention measures working on the way out important importance has .

Conclusion

In an experimental model of diabetes mellitus, degenerative-dystrophic processes in the major salivary glands of rats have a complex and multi-component nature, manifested by the interrelated reconstruction of the parenchyma, ductal system, microcirculatory bed and stroma components. The main morphological signs are atrophy and vacuolation of the secretory departments , reactive thickening of the ductal epithelium and impaired lumen dynamics, stasis and wall thickening in the vessels, perivascular edema and increased interstitial fibrosis. Morphometric indicators quantitatively confirm such trends as a decrease in the proportion of parenchyma and an increase in stroma, as well as thickening of the ductal epithelium. The obtained data indicate the central role of microcirculatory insufficiency and fibrosis in the pathogenesis of diabetic sialadenopathy and are aimed at early detection and correction of salivary gland damage. next research for morphological basis creates .

REFERENCES

1. Powers AC, D'Alessio D. Diabetes mellitus. In: Jameson JL, Fauci AS, Casper DL, Hauser SL, Longo DL, Loscalzo J., editors. Harrison's Principles of Internal Medicine. New York: McGraw-Hill Education, 2018. 3142 p.

2. Forbes JM, Cooper ME Mechanisms of diabetic complications. Physiological Reviews. Baltimore: American Physiological Society, 2013. Vol. 93, No. 1. P. 137–188.

3. Ibrokhimova L.I., Rasulov Kh.A. Influence of alloxan diabetes during pregnancy on the morphological formation of the sterno-costal complex. American Journal of Medicine and Medical Sciences DOI:10.5923/j.ajmms. 2021; 11(12): 847-850

4. Ibrokhimova LI, Rasulov Kh.A., Abdullaeva I.Kh., Morphological characteristics of the sternum of the offspring of rats with experimental sugar diabetes, 215-216 bet "Actual problems of pharmacology and pharmacotherapy" Scientific practice TTA Urganch branches.

5. Ibrokhimova LI, Features of chemical models of experimental diabetes mellitus, Pediatrics №1 / 2021 294-296p.

6. Ibrohimova L.I1Kambarova Lobar SHavkat qizi,1Ergasheva, Z.O.1 ADVANTAGES AND DISADVANTAGES OF EXPERIMENTAL DIABETES INDUCTION MODELS, ФУНДАМЕНТАЛЬНА КЛИНИК ТИББИЁТ АХБОРОТНОМАС/2026, №1 (21)

7.Lobar I. Ibrohimova Ezoza R. Habibullayeva MORPHOLOGICAL MECHANISMS OF BONE STRUCTURE AND COMPOSITION IN
OFFSPRING DEVELOPED UNDER DIABETES Central Asian Journal of Medicine № 11, 2025. Vol. 1 27-30 стрz.