

SUMMARY

CHAPTER I

Chapter I, presents the results of investigation initiated with a view of observing changes taking place in body weight, weight as well as relative weight of the submaxillary and parotid glands of alloxan induced diabetic rats. Activity of α -amylase of these glands were also estimated. Diabetic animals showed a decline in body weight, which is due to reduced anabolic activities in the body caused by deficiency of insulin. Diabetic rats showed hyperglycemia which indicated a reduced uptake of blood glucose by liver, muscles and other organs. Weight as well as relative weight of the submaxillary gland showed a non-significant decline but the relative weight of parotid showed a significant decline in diabetic rats. This gives an indication that the parotid gland was comparatively more affected in deficiency of insulin. Activity of α -amylase has been adversely affected in parotid gland of diabetic rats while it was less affected in submaxillary gland.

CHAPTER II

This chapter deals with water content, and contents of main metabolites such as glycogen, proteins and lipids. Water content of both the glands failed to show significant alterations in this endocrine disorder. Levels of reserved metabolites in form of glycogen and lipids showed significantly higher values in both the salivary glands of diabetic rats. These results indicate accumulation of the metabolites due to their reduced and affected metabolism in subnormally functioning salivary glands of diabetic rats. Comparatively higher percentage of increment of these metabolites in diabetic condition also indicate that these metabolites are greater utilized during normal functioning of submaxillary glands. The contents of these metabolites are found to be affected in submaxillary gland of diabetic rat in the absence of insulin. Only parotid gland showed significant decline in protein content since parotid gland is mainly concerned with watery proteineous secretion containing α -amylase molecules along with certain electrolytes and salts. The decrease in protein content in diabetic condition could be explained as due to reduced synthesis of proteins.

CHAPTER III

Nucleic acids (DNA and RNA) are considered as most important macro molecules involved directly or indirectly in almost all vital activities of cells. Measurement of nucleic acids gives a clear picture of intracellular activities such as mitosis, protein synthesis, growth and even degeneration or carcinogenic condition of organ. Comparatively higher level of both the nucleic acids i.e. DNA and RNA in the submaxillary than that of parotid in normal condition of animals indicate more involvement of these nucleic acids in mucous secreting activity of submaxillary gland. Increased value of DNA in both the glands of diabetic rats seems to be misleading or is only just apparent rather than an actual effect of diabetes or deficiency of insulin. However, non-significant as well as non parallel changes of the RNA levels of these two different types of salivary glands indicate that function of parotid gland has been comparatively more affected due to the deficiency of insulin in diabetic rats.

CHAPTER IV

Simultaneously operating energy generating and energy utilizing phenomena determine the active potential of any gland either in normal or abnormal conditions. Quantitative studies of activity of succinate dehydrogenase (SDH) a key enzyme of Krebs cycle and activity of Adenosine triphosphatase (ATPase) give actual idea about the energy available for function. The significant decrease in the activities of SDH and ATPase in both the types of salivary glands of diabetic rats give strong support that insulin has stimulatory action on mitochondrial activities of glandular cells of mucous as well as serous type of acini. Deficiency of insulin in the diabetic rats could be the main reason for subnormal activity of Krebs cycle and hence reduced activities of SDH in the salivary glands of diabetic rats. Decline in ATPase also indicates that lower or subnormal synthesis of various components of saliva of these glands of diabetic animals resulted in the reduced demand of energy which could be visualized from significant reduction in total ATPase activity due to deficiency of insulin.

CHAPTER V

Insulin has an influence on the synthesis of Ascorbic acid and cholesterol. Alterations in the insulin level affect the levels of ascorbic acid, cholesterol and also certain functions related to these substances in the cells. Both the types of glands of diabetic rats showed higher values of ascorbic acid and cholesterol than their corresponding values in normal health. This could be result of accumulation due to their reduced metabolism or utilization in insulin deficient condition. Comparatively higher percentage of increment of AA in submaxillary gland of diabetic rats indicates greater involvement of AA in synthesis of mucopolysaccharides of mucin which seems to be drastically affected in diabetic condition. Increased cholesterol level of both the types of salivary glands of diabetic rats could be either the result of accumulation due to its reduced utilization or due to cholesterologenesi in diabetic condition.

CHAPTER VI

Non-specific acid and alkaline phosphatases are involved in several functions. An attempt has been made to study only quantitative variations, if any, in the activities of both these phosphatases in submaxillary and parotid salivary glands of normal and diabetic rats. Unaltered activity of acid phosphatase in submaxillary and increased activity in parotid gland indicate two possibilities: (1) uptake of glucose by the glands is not affected or reduced in the deficiency of insulin and (2) increased glucose-6-phosphatase and to a certain extent increased lysosomal enzymes contribute to the total phosphatase activity. In the case of parotid gland of diabetic rats a trace of glucose can be expected in saliva. Comparatively higher activities of alkaline phosphatase in submaxillary gland of normal rats and its significant decline in diabetic condition suggest its greater role in synthesis and secretory function of mucous acini and participation of reabsorption by tubular structures. Unaltered activity of alkaline phosphatase in parotid gland of diabetic rats suggests that it is not much involved in function of serous acini.