A MICROSCOPIC STUDY OF HUMAN PITUITARY GLAND FROM BIRTH TO OLD AGE

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ABSTRACT

The histology of pituitary gland undergoes several changes with increase in age. A total of 68 cadavers were utilised to observe the histological changes in pituitary from birth to 70 years of age. The pituitary glands were removed and subjected to routine Haematoxylin & Eosin procedure. At birth, acidophils are comparatively greater than basophils indicating probably lactotroph hyperplasia due to high maternal estrogen levels. At 19 years of age (pregnant), increase in the distribution of acidophils was again observed indicating probably lactotroph hyperplasia in pregnancy. In the middle age, no major histological changes were observed in the pituitary gland. At 65 years increased amount of connective tissue forming interstitial septa was observed due to fibrosis, an age related change. At 70 years increased amount of colloid deposition was noted in the intermediate lobe cysts, an age related change. The knowledge of histological changes in pituitary with increasing age helps in understanding various endocrine and metabolic disorders.

Introduction

The microscopic study of pituitary gland is significant for its cellular diversity. It usually consists of a capsule, an adenohypophysis and a neurohypophysis. The capsule surrounds the body and stalk of pituitary gland [1]. It is derived from the meninges [2].

The adenohypophysis consists of mainly two types of cells. They are chromophobes and chromophils. Chromophobes include 50% of the cells and present with agranular cytoplasm [3]. They lack affinity for acidic or basic dyes. Chromophils include remaining 50% of the cells of which 40% are acidophils and 10% are basophils [3]. Acidophils and basophils show their affinity for acidic and basic dyes respectively. Acidophils constitute somatotrophs and lactotrophs whereas Basophils constitute corticotrophs, thyrotrophs and gonadotrophs. Somatotrophs secrete growth hormone while Lactotrophs secrete prolactin. On the other hand, Corticotrophs secrete adrenocorticotropic hormone (ACTH) and melanocyte stimulating hormone (MSH), Thyrotrophs secrete thyroid stimulating hormone (TSH) and Gonadotrophs secrete follicular stimulating hormone (FSH) and leutinising hormone (LH).

The neurohypophysis consists of unmyelinated axons originating from the supraoptic and paraventricular nuclei of the hypothalamus, an extensive vascular network, and specialized glial cells termed pituicytes [1]. Knob like nerve terminals, known as Herring bodies, represents accumulations of posterior lobe hormones such as oxytocin and vasopressin.

The hormones secreted by pituitary gland control other endocrine glands of the body. Any alteration in the cellular constituents of pituitary leads to various endocrine abnormalities. The present study describes the histological changes of human pituitary from birth to old age.

MATERIALS AND METHODS

A total of 68 cadavers of both the sexes and various age groups were studied during forensic autopsies. The pituitary glands were collected after obtaining informed consent from the kith and kin of the dead. The study was approved by institutional ethics committee. The collected glands were labelled and subsequently preserved in 10% Formalin. They include glands from birth to 70 years of age.

The collected specimen were categorized in to seven groups viz., 0 – 10 years, 11- 20 years, 21-30 years, 31- 40 years, 41- 50 years, 51- 60 years and 61-70 years based on age of the individual. Few samples from each group were subjected to routine Haematoxylin & Eosin staining procedure. The sections were observed under 4x, 10x and 40x of light microscope and the fields were photographed using photo micrographic equipment and the results were analysed.
RESULTS

A total of 68 cadavers from birth to 70 years of age were utilized for observing the histological changes of pituitary. On light microscopy, the observations at different ages were as follows-

At birth the cells of pituitary gland are clearly demarcable into acidophils and basophils. Eosin stained cells (acidophils) predominate in lateral regions of anterior lobe and includes somatotrophs and lactotrophs (Fig. 1). Hematoxylin stained cells (basophils) predominate in middle region of anterior lobe and includes corticotrophs, thyrotrophs and gonadotrophs (Fig. 1). Eosin stained cells are comparatively greater than hematoxylin cells indicating probably lactotroph hyperplasia (Fig. 1). Intermediate lobe shows cysts filled with colloid and lined by corticotrophs (Fig. 2).

At 15 years of age, equal distribution of eosin and hematoxylin stained cells in the anterior pituitary were observed (Fig. 3). No major histological changes were observed in intermediate and posterior lobes.

At 19 years of age, increase in the distribution of eosin stained cells were again observed in anterior lobe probably indicating lactotroph hyperplasia in pregnancy (Fig. 4). Increase in the deposition of colloid is observed in the cysts of intermediate lobe (Fig. 5). Pituicytes dispersed among the nerve fibre tracts were observed in the posterior lobe. They appear as elongated cells with one or more cytoplasmic processes extending into the adjacent connective tissue (Fig. 6).

At 24 years equal distribution of eosin and hematoxylin stained cells in the anterior pituitary were observed (Fig. 7). Intermediate lobe shows many foci of lymphocytes. No changes were observed in posterior lobe.

In the middle age no major histological changes were observed in the pituitary gland.

At 65 years of age, increased amount of connective tissue was observed in the anterior lobe. It formed interstitial septa within the substance of the gland (Fig. 8).

At 70 years increased amount of colloid deposition was noted in the intermediate lobe. The extension of colloid filled cysts into the anterior lobe was observed (Fig. 9). No major histological changes were observed in the posterior lobe.

Fig. 1 H&E 40x - At Birth - lateral (LR) and middle (MR) regions of anterior lobe

Fig. 2 H&E 40x- At Birth- Intermediate lobe showing corticotrophs (CO) lining the cysts (CY).

Fig. 3 H&E 40x - 15yrs - Anterior lobe showing equal distribution of eosin (Acidophils) and hematoxylin cells (Basophils).

Fig. 4 H&E 40x-19yrs- Anterior lobe of pituitary gland showing increased distribution of eosin stained cells (Acidophils).
**DISCUSSION**

The histological changes of pituitary were observed from birth to 70 years of age. On light microscopy, the observations at different ages were discussed as follows:

At birth, the cells of pituitary gland get distinguishable into acidophils and basophils. They show preferential localization as described in literature [1]. Eosin stained cells (acidophils) predominate in lateral regions of anterior lobe and includes somatotrophs and lactotrophs. Hematoxylin (basophils) stained cells predominate in middle region of anterior lobe and includes corticotrophs, thyrotrophs and gonadotrophs. Acidophils are comparatively greater than basophils indicating probably lactotroph hyperplasia. This can be explained by the following statement in literature. The late fetal or term pituitary gland shows prolactin cell hyperplasia, a reflection of high maternal estrogen levels [4, 5]. Intermediate lobe shows cysts filled with colloid and lined by corticotrophs.

At 15 years, equal distribution of acidophils and basophils in the anterior pituitary was observed. This can be explained by the fact that the lactotroph hyperplasia observed at birth is temporary [1]. No major histological changes were observed in intermediate and posterior lobes.
According to literature [6, 7], the doubling in volume of the pituitary during pregnancy is due to striking hyperplasia as well as hypertrophy of chromophobic lactotrophs, termed pregnancy cells. They persist until shortly after delivery or the termination of lactation.

In the present study at 19 years (pregnant), increase in distribution of acidophils was again observed in anterior lobe probably indicating lactotroph hyperplasia in pregnancy. Increase in deposition of colloid is observed in the cysts of intermediate lobe. Pituicytes observed in the posterior lobe appear as elongated cells with one or more cytoplasmic processes extending into the adjacent connective tissue as described by literature [1].

At 24 years of age, equal distribution of acidophils and basophils was observed in the anterior pituitary indicating that the lactotroph hyperplasia noticed in pregnancy persists for a short time. Intermediate lobe shows many foci of lymphocytes. No changes were observed in posterior lobe.

In the middle age, no major histological changes were observed in the pituitary gland. At 65 years, increased amount of connective tissue was observed in the anterior lobe. It formed interstitial septa within the substance of the gland. This can be explained by the fact that fibrosis is the most frequent age-related change in elderly people.

At 70 years of age, increased amount of colloid deposition was noted in the intermediate lobe. The extension of colloid filled cysts into the anterior lobe was observed. Literature [8] states that the cells of posterior lobe form granular cell nests or tumorlets in about 6% of autopsy pituitaries and are more common among the elderly. No such changes were observed in the posterior lobe.

CONCLUSION

The knowledge of histological changes in pituitary with increasing age helps in understanding various endocrine and metabolic disorders. It is also useful to diagnose the tumours of pituitary in old age.

REFERENCES: