Variations in the Histogenisis and Morphometry of Human Fetal Submandibular Salivary Gland

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Author’s contribution
The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

The average weights of submandibular glands of group I, II & III were 23.5mg, 54.6mg & 109.7mg respectively. The increase in ductal proliferation, lobulation and connective tissue septa formation caused an increase in the size and weight of the gland from 12 weeks to full term was observed. In the present study, in group I the gland was just behind the mylohyoid, group II the mylohyoid muscle just entering the interlobular fissure and in group III the muscle occupies half of the interlobular fissure. . About 15 to 18 tubules were found in the form of small round cluster of cells. Until the 10th week, no lobulation, no organised duct pattern and no canalised acini were seen. Canalisation of tubules starts at 12th week and reached maximum in 16th week (group I). Connective tissue was more prominent. Increase in canalised tubules from 75% to 90% in this group, also proved the fact that the ductal proliferation was more.

Keywords: Canalization; mylohyoid; submandibular glands.

1. INTRODUCTION

The submandibular salivary glands develop later than the parotid glands and appear late in the sixth week of prenatal development. Gibson (1983) studied the submandibular gland of six human fetuses observed lumen in the acini and ducts at the age of 13.5 to 16 weeks. In this we
intend to analyze and compare the morphology and histological features of human fetal submandibular salivary gland in various age groups. To compare the growth ratio and morphology (weight and dimensions like length, breadth and thickness) of right and left submandibular salivary gland of human fetuses of various groups also to compare the relations of submandibular salivary gland (in relation to mylohyoid muscle, lingual nerve and facial artery) of fetuses in various groups [1-3].

2. METHODOLOGY

A total number of 30 normal human fetuses ranging from 10 weeks to full term were collected for the study. The fetuses ranging from 10 weeks of gestation to full term were divided into 3 groups, 10 in each group viz., Group I [10-16 weeks], Group II [18-25 weeks], and Group III [28 weeks - full term]. The collected foetuses were weighed using digital weighing balance and also the gestational ages were confirmed by measuring crown rump length using the inch tape. The fetuses were examined for the presence of any anomalies and fixed in 10% formalin for ten days and submandibular region was slit open and the right and left submandibular salivary glands were dissected out. Dimensions of the digastic triangle:

Anterior limb (anterior belly of digastic muscle), posterior limb (posterior belly of digastic muscle) and base (length of base of the mandible + imaginary line between angle of mandible and mastoid process) were measured by using divider.

1. Dimensions of the gland:

Length (1), breath (b), and thickness (t) were measured by using digital vernier caliper.

2. Weight of the gland:

Weight (wt) was measured using digital weighing balance.

Shape of the gland: The shape was observed and noted by naked eye examinations.

2.1 Histological Staining

The glands were subjected to routine histological processing. Sections of 5 micron thickness were cut and stained with Haematoxylin and Eosin.

2.2 Micrometry

The dimension of lobes and lobules of submandibular glands were measured using ocular and stage micrometer measurements were tabulated.

3. RESULTS

Group 1 analysis showed that there was no definite variation in the shape of the right and left submandibular salivary glands. Both the right and left submandibular glands occupied the middle of the digastic triangle (Fig. 1). The shape of both the glands becomes irregular in this group in group 2 samples. In group 3, the shape of the glands was irregular with no significant variations between the right and left salivary glands, the right gland heavier than the left as well as the diameter greater than the left gland.

Histopathological studies showed some non canalized glandular tissue without lobules and lobes in group I samples (10th week) and also lobulation and canalization started at 12th week depicted in Fig. 1, of group II [group 1 (a&b)]. Group 2 depicts 90% termina tubules canalization & encapsulated glandular tissue (25th week).group 3 shows prominent lobules and glandular tissues with connective tissues.

| Table 1. Morphological correlations between three groups |
|-----------------------------------------------|
| Salivary glands | Length (mm) | Breadth (mm) | Thickness (mm) | Weight (mg) |
|-----------------|-------------|--------------|----------------|-------------|
| Group I average | 8.85        | 5.9          | 4.1            | 23.5        |
| Group II average| 14.65       | 8.8          | 6.6            | 54.6        |
| Group III average| 16.9        | 11.5         | 8.1            | 109.7       |
4. DISCUSSION & CONCLUSION

The present study was done to find out the changes that occurred in terms of morphology and also histology during the various changes of fetal life. The dimensions of the gland increases proportionately, on comparing with group I it is increased about 1.9 times, against group 2 it is increased by 1.15 times. The study of morphometric and histogenesis of human foetal submandibular salivary gland gives us insight into the growth and differentiation of the gland and for better understanding of the developmental anatomy [4-8]. Throughout foetal life the submandibular salivary gland progressively increases in size and weight due to ductal proliferation and increased lobulation and connective tissue septa formation. The present study may be useful for clinicians especially in understanding the normal pattern of the submandibular salivary gland development in fetal period and also to delineate any abnormal developmental problems. We believe that the results obtained from this study will be beneficial in understanding the development of submandibular salivary gland and also to contribute to future studies in dental surgery, fetopathology, perinatology and in radio diagnosis.

CONSENT

It is not applicable.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Author has declared that no competing interests exist.

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