Journal of Pharmaceutical Research International

33(49B): 290-293, 2021; Article no.JPRI.72162
ISSN: 2456-9119
(Past name: British Journal of Pharmaceutical Research, Past ISSN: 2231-2919, NLM ID: 101631759)

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

S. Nedunchezhiyan[1*]

[1]Department of Anatomy, Sree Balaji Medical College & Hospital Affiliated to Bharath Institute of Higher Education and Research, Chennai, Tamil Nadu, India.

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/JPRI/2021/v33i49B33365
Editor(s):
(1) Ana Cláudia Coelho, University of Trás-os-Montes and Alto Douro, Portugal.
(2) Paola Angelini, University of Perugia, Italy.
Reviewers:
(1) Lattupalli Hema, DR.N.T.R. University Of Health Sciences, India.
(2) Ebbi Donald Robinson, Rivers State University Teaching Hospital, Nigeria.
(3) Maha Amin Abd Allah Ahmad Khattab, Zagazig University, Egypt.
Complete Peer review History: https://www.sdiarticle4.com/review-history/72162

Short Research Article

Received 30 August 2021
Accepted 10 November 2021
Published 13 November 2021

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 10^{th} 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 digastric triangle:

Anterior limb (anterior belly of digastric muscle), posterior limb (posterior belly of digastric 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 digastric 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 (10^{th} week) and also lobulation and canalization started at 12^{th} week depicted in Fig. 1 [group 1 (a&b)]. Group 2 depicts 90% termina tubules canalization & encapsulated glandular tissue (25^{th} 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

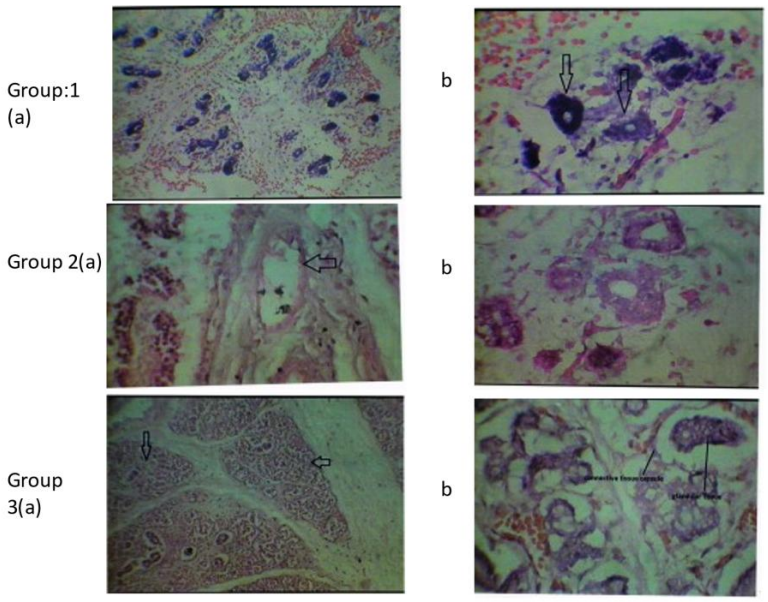

Fig. 1. Histopathological studies

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 the foeta 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.

REFERENCES

1. Aldo Kano, Haruo Hagiwara, Kuniaki Takata, Kenji Mogi. Immunolocalization of Centriole-associated Striated Rootlets in Human; 2001.
2. Cutler LS. Epithelial-mesenchymal interactions in the development of salivary glands,. Critical Reviews in oral Biology Medicine. 1991;2(1):1-12.
3. El - Mohandes EA, Botros KG, Bondok AA. Prenatal development of the human submandibular gland. Acta Anatomica. 1987;30(3):213-218.
4. Gibson MH. The prenatal human submandibular gland: a histological, histo-chemical and ultrastructural study. Anatomischer Anzeiger. 1983;153(1):91-105.
5. Gulnur take, Celal Ilgaz, Deniz Erdogam, Candan· Ozogul, Cigdem Elmas. A

comparative study of the ultrastructure of submandibular, parotid and exocrine pancreas in diabetes and fasting. Saudi Medical Journal. 2007;28(1):28 - 35.

6. Harrison JD, Auger DW, Katherine, Paterson PS, Rowley A. Mucin histochemistry of submandibular and parotid salivary glands of man: Light and electron microscopy, The Histochemical Journal. 1987;19(10-11):555-564.
7. Illustrated Dental Embryology, Histology, and Anatomy, Bath- Balogh and Fehrenbach, Elsevier. 2011;135.
8. Johannes Zenk, a, Werner G. Hosemann, Heinrich Iro. Diameters of the main excretory ducts of the adult human submandibular and parotid gland: A histologic study of Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 1998;85(5):576-580.

Peer-review history:
The peer review history for this paper can be accessed here:
https://www.sdiarticle4.com/review-history/72162