"STUDIES OF SALIVARY IMMUNOGLOBULINS IN MALNOURISHED EGYPTIAN INFANTS"

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Introduction and Aim of the Work

Protein Calorie malnutrition is a major contributing factor to infection especially in developing countries, and there is a clinical impression that malnourished children are prone to infections that occur on body surfaces.

In fact most of the infectious factors either occur wholly on the secretory surfaces or enter the body through a secretory surface. So the study of immunology of the secretory surfaces is a relatively new area of investigations.

The mucosal surfaces of the children suffering of Protein Calorie malnutrition are particularly suceptible to increased colonization or invasion by microorganisms. Many studies suggested a local immunological system which supplies immunoglobulins to the fluids that bathe mucous membranes.

Salivary fluid is one of the most important exocrine secretions of the body, i.e. secretions that bathe mucous membranes having continuity with the external environment. The examination of the salivary secretion in general can give an idea about the internal environment of the organism.

Our present study of the immunoglobulins in the saliva of the malnourished Egyptian infants suffering from Marasmus, Kwashiorkor, and Iron Deficiency Anemia might reflect the degree of local or regional immunity which is not dependent on serum antibodies.

Review of Literature

Anatomy of the Salivary Glands

Saliva is an exocrine secretion. It is the mixed secretion of three pairs of salivary glands as well as some other minor salivary glands.

The three large pairs of glands are the parotid, the submandibular and the sublingual.

The parotid is the largest of the salivary glands; it is situated in the triangular hollow behind the mandible. It is triangular in cross section , and has three surfaces: lateral, anteromedial and posteromedial.

The lateral surface is subcutaneous and is related to the superficial preauricular lymph node. The antero-medial is related to the mandible, masseter and medial pterygoid muscles ; and the facial nerve emerges through it. The posteromedial surface overlaps the styloid and mastoid processes of the temporal bone, the posterior belly of the digastric and sternomastoid muscle; it is pierced by the facial nerve.

The gland is divided by a plane of cleavage which is formed by the facial nerve into superficial and deep parts. It opens by the Stensen's duct which passes horizontally forwards superficial to the masseter to open in the vestibule of the mouth opposite the crown of the upper second molar tooth.

The parotid gland has a parasympathetic supply from the inferior salivatory nucleus. The preganglionic fibres pass through the glossopharyngeal nerve to the tympanic plexus in the middle ear, then through the lesser petrosal nerve to relay in the otic ganglion.The postganglionic fibres pass from the otic ganglion to join the auriculotemporal branch of the mandibular nerve to reach the gland.

Concerning the sympathetic supply; the preganglionic fibres arise from the upper thoracic segments of the spinal cord then ascend through the sympathetic chain to the upper cervical ganglion. The post ganglionic fibres accompany the external carotid artery to the gland.

The blood supply of the parotid gland is derived from the external carotid artery.

The submandibular gland is about half the size of the parotid. It is oval in outline, triangular in cross section, and has three surfaces : lateral, infero-lateral and medial.

The lateral surface is related to the submandibular fossa of the mandible , the insertion of the medial pterygoid muscle, and part of the facial artery.The inferolateral surface is related to the platysma and the common facial vein. The medial surface is related to the mylohyoid and hyoglossus muscles, the lingual and hypoglossal nerves with the submandibular duct in between.

Concerning its nervous control; the parasympathetic supply comes from the superior salivatory nucleus through the chorda tympani branch of the facial nerve which joins the lingual nerve and relays in the sub-mandibular ganglion. The postganglionic fibres pass directly to the gland.

The sympathetic supply is similar to the parotid but the postganglionic fibres accompany the facial artery.

The gland opens by Wharton's duct into the floor of the mouth beside the frenulum of the tongue on the summit of the sublingual papillae. Its arterial supply consists of small glandular branches from the facial artery

The sublingual gland is the smallest of the three large pairs of salivary glands. It lies in the floor of the mouth. It is oval in outline and is related laterally to the sublingual fossa of the mandible, medially to the genioglossus muscle and the submandibular duct, and inferiorly it is related to the mylohyoid muscle which separates it from the submandibular gland.

The gland opens by numerous small ducts (about 10-20) into the summit of the sublingual fold in the floor of the mouth.

As regards its nervous control : the parasympathetic preganglionic fibres are similar to the submandibular gland; but the postganglionic fibres rejoin the lingual nerve to reach the gland. Its sympathetic supply is similar to the submandibular gland but the postganglionic fibres accompany the lingual artery.

The blood supply of the gland is derived from the lingual artery by the sublingual branch.

Besides the three major pairs there are many minor salivary glands that are scattered under the mucous membrane of the hard palate , the soft palate, the pharynx, and the sides of the tongue. They open by small ductules directly into the mouth.

Their parasympathetic preganglionic fibres come also from the superior salivatory nucleus, then through the facial nerve to the greater petrosal branch, and from there they relay in the sphenopalatine ganglion. The postganglionic fibres pass through the greater and lesser palatine nerves and the pharyngeal branches of the maxillary nerve. Their sympathetic supply passes from the upper thoracic segments to the maxillary artery. (Last, 1978, Gray, 1962, Cunningham, 1960)

Physiology of the Salivary Glands

Saliva performs a number of important functions.It facilitates swallowing,keeps the mouth moist , and serves as a medium in which the molecules that stimulate the taste buds are dissolved. It facilitates the movements of the lips and tongue and hence the act of speech. It has an antibacterial action because it keeps the mouth and teeth clean. It was found that patients with Xerostomia suffer of dental caries. Mucin is secreted by the mucous cells, it is a glycoprotein acting as a lubricant to food in the mouth,(Ganong, 1981).

Saliva contains the digestive enzyme ptyalin, or salivary αamylase which is very identical to pancreatic amylase. It is secreted by the serous cells in the glands It has a minor role in starch digestion because the optimal pH for this enzyme to act is 6.7 and its action is inhibited by the gastric juice when food enters the stomach, (Bell, 1975).

The salivary amylase has the property of hydrolysing the 1-4 α glycosidic linkages between the glucose molecules. This type of bond occurs when the polysaccharide molecule is present in straight chain as in amylose. But it spares the 1-6 α linkages as in amylopectin. Consequently the end product of the amylase digestion are oligosaccharide, the disaccharide maltose, the trisaccharide maltotriose, and some slightly larger polymers. This enzyme is stored in the zymogen granules in the alveolar cells of the acini, and is secreted from there directly to the ducts.(Ganong , 1981).

The mean rate of flow of parotid fluid is 0.04ml/min with an average standard deviation of 0.031 ml/min, (Shannon, 1967).

The pH of saliva is about 7 and is maintained by buffers. At this pH saliva is saturated with calcium so the teeth do not loose calcium to oral fluids.

The secretory process is under neural control: Stimulation of the parasympathetic causes profuse secretion of watery saliva with relatively low content of organic material. It also produces pronounced vasodilatation in the gland. Atropine and other cholinergic drugs abolishes salivary secretion but not vasodilatation, (Bell, 1975).