HISTOLOGICAL AND HISTOCHEMICAL SKIN CHANGES IN INSULIN-DEPENDENT DIABETIC PATIENTS WITH AND WITHOUT LIMITED JOINT MOBILITY

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Diabetic joint alterations have been the object of numerous studies for several years and in the course of these studies further knowledge of its etiology has been acquired. During the 1970's ROSENBLOOM and FRIAS became concerned with skin and joint mobility alterations of the diabetic hand, which led to a series of studies in relation to this nosological entity, variously termed as sclerodermia-like syndrome, cheiroarthropathy, and limited joint mobility (LJM), etc. It has been reported that approximately 50% of diabetics after over 5 years of evolution exhibit LJM; however, in one of our series which included 106 insulin-dependent diabetics, we found LJM in 68% of the patients.

A genetic component has been suggested as a possible factor associated with the development of this disorder; the duration of diabetes and LJM onset are also thought to be closely related. Some authors agree that metabolic control is a factor influencing these alterations. However, these criteria have received controversial support, and so far, histological studies in relation to LJM are scarce.

At present we are engaged in a series of studies intended to explore the internal and pathophysiological mechanisms of this disorder more closely.

The present paper is part of the investigations in progress and is intended to shed light upon aspects related to histochemical and histomorphological skin alterations in a diabetic group, as well as to determine their relationship with the presence or absence of LJM.

Key-words: Collagen fibers; Elastic fibers; Limited joint mobility (LJM); Mucopolysaccharides; Rete pegs.

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MATERIALS AND METHODS

Twenty-four diabetic patients from the Diabetes Clinic for Children and Adolescents of the National Institute of Endocrinology were examined for skin alterations. LJM was present in 16 patients and absent in 8; ages ranged between 11 and 22 years in both groups ($\bar{x} 18 \pm 4.5$ vs $16.1 \pm 3.7$, respectively). Diabetes history was $6.6 \pm 4.1$ and $8.5 \pm 6.1$ years, respectively. Metabolic control as expressed by glycosylated hemoglobin levels was similar in both groups ($11 \pm 2.1$ vs $10.1 \pm 1.7$, respectively). In addition, 7 biopsies were performed in a similar number of healthy individuals who were to be submitted to surgical interventions for non-systemic diseases and used as controls.

With previous consent obtained from the parents or tutors and the patients, we proceeded to collect skin samples of approximately $0.5 \times 0.3$ cm from the medial dorsal region of the hand. The samples thus obtained were placed in 4% formol with 1% calcium chloride during 48-72h, and later embedded in paraffin and sectioned by microtome.

For histological and histochemical investigation the following staining agents were used:
1. Hematoxylin and eosin for general study;
2. Alcian blue with PAS for mucopolysaccharides (MPS);
3. Hale's method with colloidal iron, modified by Mueller-Mowly for mucopolysaccharides (MPS);
4. Gomori methods for reticular fibers;
5. Verhoffs methods for elastic fibers in combination with the van Gibson's method for collagen fibers.

Quantitative, semi-quantitative and qualitative methods were used in the comparative study of different structural components of the skin and their changes.

Cellular lines were counted at epidermal level and cellular flattening was indicated by the following three findings: a) the presence of flat zones (subdivided into 3 categories according to their thickness); b) rete pegs; and c) dermal papillae counted in 3 microscopic fields. The accumulation of various products was estimated in three different grades according to (a) the opening of the lumen and (b) the presence of fibrous cord-like vascular modifications considered in a 1 to 3 value scale in relation to the reference unit established for controls.

For this study an Amplival Light Microscope was used.

Statistical analysis was performed using Student's $t$-test and Chi square test with a significance level of $\alpha = 0.05$.

RESULTS

Table 1 shows the group distribution by epidermal characteristics and changes observed. Here one may observe that flattening was more marked in diabetics than in controls ($p < 0.005$), and more severe, although non-significant, in patients with LJM as compared to those without LJM.

Rete pegs and dermal papillae were significantly decreased in diabetics, and significant differences were observed between groups without and with LJM, the latter being the most severely affected.