SKIN CHANGES IN THE DIABTIC PATIENT

THESIS

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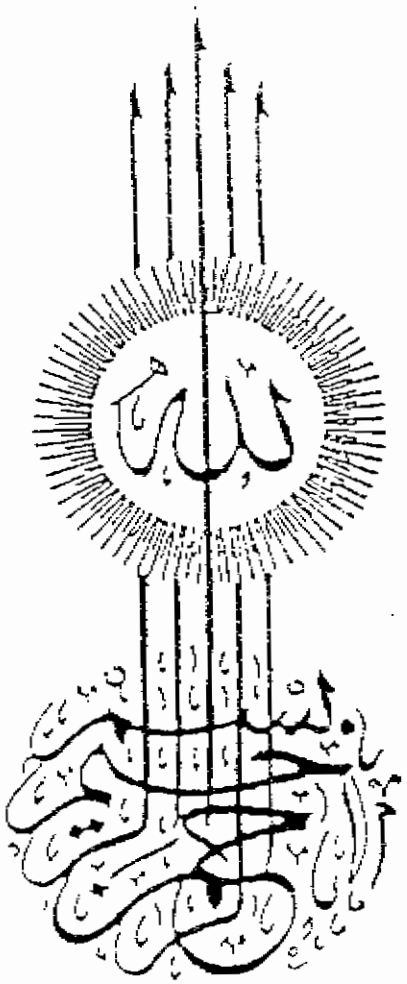

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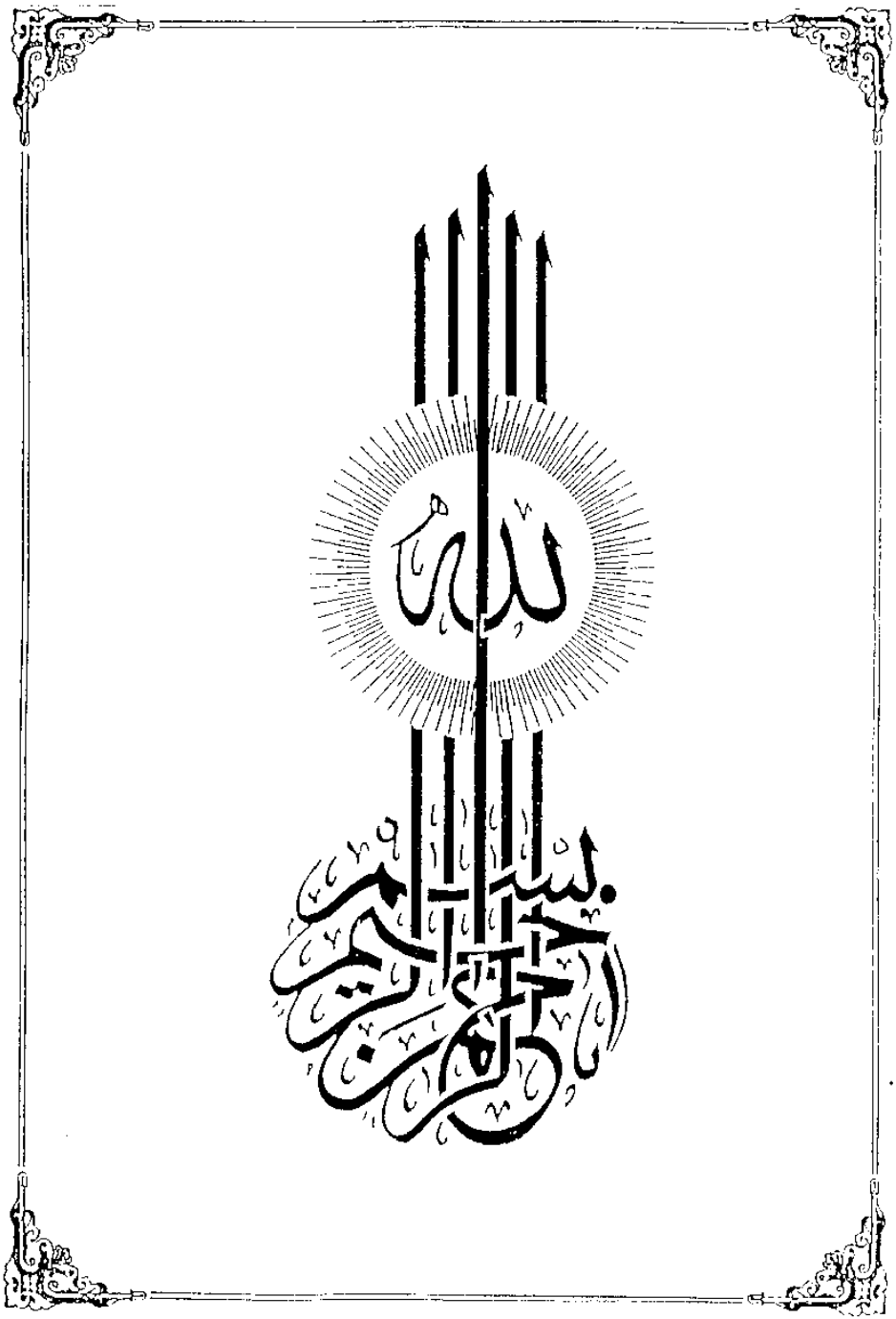

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Diabetes mellitus is a clinical syndrome characterized by impaired carbohydrate utilization and hyperglycemia caused by deficiency or diminished effectiveness of insulin.**(Macleod, 1981)**. The disease has been recognized since antiquity, and is of particular importance because of its prevalence, which is about 2 % of any population. Diabetes mellitus is the most common of the endocrine disorders. The name is derived from the sweet taste of urine from patients with the disorder (mellitus = honey) due to the glucosuria resulting from elevated blood glucose.**(Hartog, 1984)**.

The disease is chronic and affects the metabolism of carbohydrate, protein, fat, water and electrolytes, sometimes with grave consequences. The metabolic derangement is frequently associated with permanent and irreversible functional and structural changes in the cells of the body, those of the vascular system being particularly susceptible. The changes lead in turn to the development of a well-defined clinical entities, the so called "complication" of diabetes.**(Macleod, 1981)**.

When insulin was discovered, it was assumed that the conquest of diabetes was finally at hand. It soon became apparent, however, that insulin therapy could only alleviate some of the manifestations of diabetes, and that patients with this disease still suffered from many of its complications. When advances in medical therapy facilitated the treatment of some of the acute, life-threatening complications of diabetes such as diabetic coma or infection, it became clear that the extended life span of diabetics promoted the fuller expression of other disease manifestations.**(Huntley, 1986).**

The complications of diabetes are formidable, diabetics have a significantly shorter life span than non diabetics. Diabetics experience an early onset and rapid progression of arteriosclerosis which probably accounts in large part for increased mortality rate, blindness, severe neuropathy and renal failure are frequent consequences of diabetes. **(Braverman and Keh-Yen, 1984).**

No organ system appear to be immune from the effects of this disease. The skin is one of these organs affected by diabetes. Cutaneous manifestations are many and vary from trivial to life-threatening. Of the dozens of skin signs and symptoms described for diabetes, however, non is pathognomonic for this disease.**(Huntley, 1986).**

Cutaneous manifestations in patients with diabetes mellitus are of particular importance to the dermatologist and internist for two main reasons. Without control of the diabetes there will be little or no response of some of the cutaneous processes to local therapy and the cutaneous manifestations may be the first evidence of diabetes and thus make early diagnosis and treatment of the diabetes mellitus possible.(**Pastras and Beerman, 1964**).

The cutaneous involvement associated with this disease is worthy of study by the practitioner because of the numerous and varied complications of the disease. Previous estimates of the prevalence of skin manifestations of diabetes were about 30%. In fact the actual prevalence of diabetic skin manifestations probably approaches 100%, especially if one looks for metabolic effects on the microcirculation and changes in skin collagen.(**Huntley, 1989**).

It is also becoming clear that some of the cutaneous findings may reflect the degree of long-term control in this disease. The metabolic condition of hyperglycemia has effects on most tissues of the body, skin included. The resulting manifestations may at some point be used as an indicator of metabolic control.(**Huntley, 1989**).

Aim of the work

Review of the literature as regards the changes which may occur in different structures of the skin of a diabetic patient and the role of these changes in initiating or predisposing to various pathological conditions which may occur in his skin.

STRUCTURE OF THE SKIN

Structure of the normal skin

The skin consists of an epithelium (epidermis), a connective tissue matrix (dermis) and adipose tissue (hypodermis).**(Holbrook and Wolff, 1987).**

The epidermis:

It is the most outer portion of the skin that consists of two types of cells: keratinocytes and dendritic cells. As they differentiate into horny cells, the keratinocytes are arranged in four layers:

1- Basal cell layer:

It is formed of one cell layer, attached to the subepidermal basement membrane zone. The basal cell layer has stem cells by which the epidermis is maintained by cell division within the basal layer.**(Epstein and Maibach, 1965).**

2- Squamous cell layer:

It is five to ten layers thick, become flattened towards the surface.**(Ebling, et al., 1992).**

3- Granular cell layer:

It is only one to three cell layers thick, contains the keratohyaline granules which are the precursor form of the protein flaggrin formed during the transition of a granular

cell into cornified cell.**(Arnold, et al., 1990).**

4- Horny cell layer:

It forms the major barrier of the skin. In addition to producing keratin, keratinocytes produce various chemicals that may have immunologic functions. **(Arnold, et al., 1990)**

Basement membrane zone

It forms the junction between epidermis and dermis. It is considered to be a "porous" semipermeable filter, which permits exchange of cells and fluids between the epidermis and dermis.**(Raj, 1988).**

Epidermal dendritic cells:

1- Melanocytes:

They are pigment synthesizing dendritic cells, each melanocyte is related to about 36 keratinocytes as an epidermal melanin unit.**(Cochran, 1970).**

2- Langerhans cells:

They are normally found scattered among squamous cell layer, these cells are related to immunological processes carried out by the skin.**(Wolff and Stingl, 1983).**

3- Indeterminate cells:

They are occasionally found within the epidermis. They are related to langerhans cells, and are considered as

immature langerhans cells migrating from the blood vessels. **(Arnold, et al., 1990).**

4- Merkel cells:

They are basally situated cells and are thought to mediate the sensation of touch.**(Arnold, et al., 1990).**

Epidermal appendages

1- Sebaceous glands:

They are halocrine glands that are associated with the hair follicles of all skin areas except the palms and soles. **(Montagna, 1974).** They secrete the sebum, forming a lipid film on the skin which controls moisture loss from the epidermis and protect the skin from fungal and bacterial infections.**(Ebling and Cunliffe, 1992).**

2- Sweat glands:

There are two types of sweat glands:

a- Eccrine type : which are distributed all over the skin surface, their main function is temperature regulation **(Arnold, et al., 1990).**

b- Apocrine type : which are located mainly in the axillae and perineum, they are related to hair follicles. Their secretion in man serves no known function. **(Arnold, et al., 1990).**

3- Hair follicles:

They populate the entire cutaneous surface except for palms, soles and glans penis. The hair follicle is divided anatomically into: infundibulum, isthmus and matrix. **(Ebling, 1976).**

The dermis

It is tough and resilient tissue which provides nutrient to the epidermis and cutaneous appendages. The dermis is formed by connective tissue , vascular bed, lymphatics, nerves and cells. The connective tissue is formed of collagenous and elastic fibres embedded into ground substance.**(Lever and Schaumburg-Lever, 1990).**

Collagen fibres

These represent the major dermal constituent, providing both tensile strength and elasticity.**(Holbrook and Wolff, 1987).** Collagen fibres exist either as thick parallel interlacing bundles trapping few fibroblasts in the reticular dermis, or as finely wavy network mainly in the papillary dermis and surrounding blood vessels, pilosebaceous units and sweat glands.**(Lever and Schaumburg-Lever, 1990).**

The fibres are formed by association of collagen molecules. Each molecule is composed of three polypeptide chains called alpha chains, which are coiled on each other to form a triple helical structure and having a globular domain