A DISSERTATION ON THE CUTANEOUS MANIFESTATIONS OF DIABETES MELLITUS A CLINICAL STUDY

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CERTIFICATE

Certified that this dissertation entitled ***"CUTANEOUS MANIFESTATIONS OF DIABETES MELLTUS – A CLINICAL STUDY"*** is a bonafide work done by **DR. R. THENMOZHI,** Post Graduate Student of the department of Dermatology, Venereology and Leprosy, Madras Medical College, Chennai – 600 003, during the academic year 2006 – 2009. This work has not previously formed the basis for the award of any degree.

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CONTENTS

INTRODUCTION

Diabetes mellitus is a metabolic disorder characterized by elevated fasting and postprandial blood glucose levels and disturbances in the carbohydrate and lipid metabolism. Its prevalence is increasing in the present scenario of a stressful life style in the general population. Abnormalities of insulin and elevated blood glucose level lead to metabolic, vascular, neurological and immunological abnormalities. Affected organs include cardiovascular, renal and nervous systems, eyes and the skin. The skin is affected by both the acute metabolic derangements and the chronic degenerative complications of diabetes. Skin, the largest organ of the body is capable of reflecting these changes in a striking manner and some of the cutaneous markers have been labelled as cutaneous manifestations for this metabolic disorder. Several studies have been conducted to assess the Skin-Diabetes relationship. This is one such study not only to know the Skin-Diabetes relationship but also to explore the newer manifestations with advancing knowledge of the disease.

REVIEW OF LITERATURE

The incidence of diabetes in the normal population is 2.3% in urban population and 1.5% in the rural population[1]. Diabetes mellitus is classified according to National Diabetes Data Group into primary and secondary type[2].

PRIMARY

1. Insulin dependent Diabetes mellitus IDDM (Type 1).
2. Non Insulin dependent Diabetes mellitus NIDDM (type 2)
    a. Non obese NIDDM
    b. Obese NIDDM
    c. Maturity Onset diabetes of the young (MODY)

SECONDARY

1 Pancreatic disease

2 Hormonal abnormalities

3 Genetic disease

4 Ingestion of certain drugs or chemical compounds

IMPORTANCE OF CUTANEOUS MANIFESTATIONS IN DIABETES MELLITUS[3]:

1. Many cutaneous diseases precede or signal the onset of diabetes mellitus.
2. Some of the cutaneous lesions are diagnostic markers to the diagnosis of diabetes mellitus.
3. Serious life threatening presentations can occur.
4. Minor skin infections potentiate major complications and serve as a key to the prevention and treatment of complications.
5. Some skin manifestations reflect duration of diabetes.

CLASSIFICATION OF CUTANEOUS MANIFESTATIONS OF DIABETES MELLITUS[4]

1. Cutaneous manifestations that accompany, acute, gross metabolic disturbances.

2. Cutaneous manifestations that correlate with chronic degenerative changes.
3. Cutaneous manifestations that occur more frequently in diabetics but without correlation to metabolic derangements or degenerative changes.
4. Cutaneous complications of diabetic therapy.

CUTANEOUS MANIFESTATIONS THAT ACCOMPANY GROSS METABOLIC DISTURBANCES

1. INFECTIONS
2. XANTHOMATOSIS
3. YELLOW SKIN

CUTANEOUS INFECTIONS IN DIABETES MELLITUS:

Diabetics are said to be more prone for infection because of its influence on various factors as follows[5]:

(a) Effect on immunity:

- Chemotaxis of the polymorphonuclear leucocytes are greatly reduced in ketoacidotic patient when compared to controls.
- Phagocytic ability of polymorphs are decreased when plasma glucose level reaches > 250 mg/dl.
- Lymphocyte transformation in response to mitogen phytohemagglutinin was diminished in poorly controlled diabetes.

(b) Level of glucose control:

Candida albicans has direct correlation to the concentration of glucose especially in the saliva.

(c) Peripheral vascular disease common in diabetics, increase the risk of infections.

(d) Sensory neuropathy makes the patient unaware of trauma, inviting secondary infection.

(e) Xerosis of the skin predisposes to skin infection.

BACTERIAL INFECTIONS

Skin infections due to Group A streptococcus hemolyticus and staphylococcus aureus are common in diabetic patients. Staphylococci colonize more in the lower extremity of adults with vasculopathy and neuropathy with increased incidence of post operative infections than in non-diabetics[6]. Furunculosis, Carbuncle and Erysipelas are much more common in diabetic persons than their non diabetic counterparts in the pre antibiotic era[3]. Malignant otitis externa is an uncommon, life threatening infection of the external auditory canal with potential intracranial involvement caused by pseudomonas aeruginosa. 70-95% of patients with malignant otiti externa have diabetes[7].

Necrotizing fasciitis is a life threatening bacterial infection of the soft tissues with spread along facial planes. The perineum, trunk, abdomen and extremities especially legs are the most commonly involved sites. Clinical presentation includes erythema, swelling, induration, necrosis and bullae formation. Patients are febrile with severe toxicity. Most cases result from polymicrobial facultative gram negative bacilli such as Escherichia coli and anaerobes such as Bacteroides, peptostreptococcus.

10% of cases are mono microbial, often due to streptococcal species. 10-60% of all cases of necotizing fasciitis occur in patients with Diabetes mellitus[8].

Erythrasma is a bacterial infection of the skin caused by corynebacterium minutissimum characterised by well defined reddish brown scaly patches with irregular border. The sites involved are intertriginous areas of the groin, axilla and toe webs. The causative bacteria produces a porphyrin that usually flouresces coral red with wood's lamp examination. 61% of diabetics are carriers of diptheroids and are associated with obesity.

FUNGAL INFECTIONS

CANDIDIASIS

Candidal infections of mucous membrane, genitalia, nails are more prevalent in patients with poorly controlled diabetes than in the population without diabetes. Women are more prone to these infections than are men. The ratio of epidermal glucose to blood glucose is higher

in diabetics than in non diabetics, an environment that is more favourable for the growth of yeast and fungi. Oral candidosis is associated with diabetes and diabetic saliva is known to produce growth of candida invitro[10]. 9.8% of the diabetic women have paronychia compared to 3.4% in non diabetics[11]. Candidal intertrigo particularly Erosio interdigitalis blastomycetica is common in diabetics in between the third and fourth finger.

Vulvovaginal candidosis is characterized by pruritus, vulval erythema and occasionally fissuring, pustules. Severity of pruritus is proportional to the degree of glycosuria and hyperglycemia[12]. Candidal Balanitis presents as diffuse or focal erythema of the glans penis with pain, pruritus. Elderly men with Balanitis and phimosis should be evaluated for diabetes.

DERMATOPHYTOSIS

Tinea pedis is common in diabetics than in general populations[13]. It forms a route of bacterial infection in diabetics, especially in those with neuropathy and vasculopathy. 12.8% of chronic dermatophytosis have

diabetes. Tinea cruris and Tinea corporis are common clinical types. Trichophyton rubrum was the commonest isolate followed by Trichophyton mentagrophytes[14].

MUCORMYCOSIS

Rhinocerebral mucormycosis is the most common and fulminating type of Zygomycosis caused by Rhizopus, Mucor and Absidia. This clinical type is invariably associated with Acute Diabetes mellitus, Hyperglycemia and ketoacidosis. It presents as brownish, blood stained nasal discharge on the affected side, black eschar covered ulcer on the palate, fixed and dilated pupil, proptosis, ptosis and complete ophthalmoplegia. As the fungus is vasculotrophic[15], it causes necrosis of the tissue with thrombosis of the cavernous sinus and meningoencephalitis can occur. It is invariably fatal if not treated early by surgical debridement, correction of electrolyte imbalance and Amphotercin - B.

PITYRIASIS VERSICOLOR

Accumulation of extracellular glycogen due to diabetes is considered to be a predisposing factor in the pathogenesis of pityriasis versicolor.

XANTHOMATOSIS

ERUPTIVE XANTHOMAS

Occur 1 in 1000 diabetics. Sustained hyperlipidemias affecting plasma triglycerides and cholesterol is common in diabetics. Decreased lipoprotein lipase activity in insulin dependent diabetes mellitus results in elevated serum triglycerides level. Cutaneous Xanthomas form when the serum triglyceride level rises to 1000 mg/dl. Eruptive xanthomas result from deposition of lipid in the histiocytes in the dermis or subcutis. It presents as multiple, small, reddish yellow papules over the extensor surfaces and buttocks. It is common in males. Rapid regression occurs when diabetes is under control[17].

XANTHELASMA PALPEBRARUM

It is characterized by plane xanthomas occurring in the eyelids. It is common in females. It occurs in 1.8% of the diabetics and are associated either with increase in serum cholesterol levels or no lipid abnormality. It does not regress when therapy for diabetes is started.

YELLOW SKIN

Yellow skin seen in some diabetic patients may be due to elevated serum carotene and non enzymic glycosylation of dermal collagen that eventually become yellow.

CUTANEOUS MANIFESTATIONS THAT CORRELATE WITH CHRONIC DEGENERATIVE CHANGES

DIABETIC MICROANGIOPATHY[18]

Both large and small blood vessels are involved in diabetes. Proliferation of endothelial cells and deposition of PAS-positive material in the basement membrane of arterioles, capillaries and venules producing narrowing of the lumen are the features of diabetic microangiopathy.

Cutaneous signs of microangiopathy are erysipelas like erythema, wet gangrene of the foot, diabetic rubeosis, diabetic dermopathy and large vessel disease.

ERYSIPELAS LIKE ERYTHEMA

Well demarcated Erysipelas like erythema occur on the legs or feet of elderly patients with an average duration of diabetes mellitus of 5 years. It seems to correlate with an underlying destructive bone disease caused by a small vessel insufficiency. There is no fever, elevated ESR or leucocytosis and it seems to be an important sign of localized functional microangiopathy[3].

DIABETIC RUBEOSIS[18]

A peculiar rosy reddening of the face and sometimes of the hands and feet may be seen in long standing diabetes. It has been attributed to diabetic microangiopathy or decreased vascular tone.

DIABETIC DERMOPATHY[19]

Also called as DIABETIC SHIN SPOTS or PRETIBIAL PATCHES. This is the most common dermatosis associated with diabetes mellitus. It was noted in 1964 by Melin as atrophic circumscribed brown patches in the front and sides of the lower portion of both the legs. The lesions are common in men than in women. It occurs in 14% of adult male diabetics and 73% of male diabetics over 70 years. Historically the dermal arterioles and capillaries show thickening and deposition of PAS positive, fibrillar material in the vessel walls. Hemosiderin deposits due to extravasation of red blood cells are also seen.

PERIUNGUAL TELANGIECTASIA

Dilatation of capillaries and venules in the nail folds is seen in 50% of diabetics and unlike in connective tissue diseases, venules are uniformly dilated.

WET GANGRENE OF THE FOOT[18]

This is a late manisfestation of diabetic microangiopathy.

LARGE VESSAL DISEASE[18]

Atherosclerosis is the second most common form of vascular disease frequently associated with diabetes mellitus. It results in skin alrophy, hair loss, coldness of the toes, nail dystrophy, pallor on elevation and mottling on dependence and is also responsible for intermittent claudication. Ischemic gangrenous lesions of the legs and feet are common sequelae.

DIABETIC NEUROPATHY

Elderly patients in whom the onset of diabetes is insidious are especially at risk of developing diabetic neuropathy. Commonly, there is a distal symmetrical polyneuropathy with mixed motor and sensory nerve involvement.

AUTONOMIC NEUROPATHY[20]

Autonomic nervous system may be the first nervous tissue affected in diabetics and mostly affect the feet. The key physical finding is the decreased or absent sweating of the lower extremities. Patients with diabetic sensory neuropathy have accompanying autonomic involvement.

MOTOR NEUROPATHY

Motor neuropathy of the foot is characterized by dorsally subluxed digits, distally displaced plantar fat pads, depressed metatarsal heads, hammer toes and pes cavus.

SENSORY NEUROPATHY

Sensory abnormalities of the lower extremities include numbness, tingling, aching and burning sensation. Restless leg and burning feet are common complaints which intensify at night while lying down.

DIABETIC FOOT ULCERS OR MALPERFORANS[21]

It is a serious complication resulting from confluence of multifactorial pathogenetic mechanisms. Neuropathy (motor, sensory and autonomic) and microangiopathy are the contributing factors for its development, the neuropathy being the major factor. Lack of sensation allows the trauma to go unnoticed and may result in traumatic ulceration that is complicated by the defective microcirculation. Prolonged pressure on the subcutaneous tissue causes strangulation of the vascular supply that causes ischemic fat necrosis and too much force exerted for a work out of proportion to what is actually required lead to formation of ulcers called ‘Mal perforans’. This might lead to fracturing of the bones of the feet to form charcots foot. Prevention is far more relevant than cure, hence care of the foot must become a routine in diabetic patients.

DIABETIC BULLAE

They are distinct markers of diabetes characterized by abrupt onset of bullae on the lower extremities, usually the toes, feet and shin. The blisters are usually painless and pruritic. Heals without scarring in 2-5 weeks. They develop spontaneously without any evidence of trauma or vascular insufficiency. Histopathological examination of the bullae shows an inconsistent level of separation varying from intra epidermal to sub epidermal[22]. Although a history of antecedent trauma is not elicited, increased skin fragility may play a role in diabetic bullae. Perhaps the formation of advanced glycosylation end products lead to increased fragility[23].

SCLEREDEMA DIABETICORUM

Occur in 2.5% to 14% of patients with diabetes mellitus[24]. Most patients have NIDDM. Scleredema diabeticorum is a disease of long standing diabetes, associated with obesity[25]. It presents as insidious onset of

painless, symmetrical induration and thickening of the skin on the upper back and neck. Spread to the face, shoulder and anterior torso may occur. The skin retains a non pitting, woody, ‘peaud’ orange quality. The pathogenesis of scleredema is postulated to be unregulated production of extracellular matrix molecules by fibroblast leading to thickened collagen bundle and increased deposition of glycosaminoglycans.

CUTANEOUS DISORDERS THAT OCCUR MORE FREQUENTLY IN DIABETES MELLITUS BUT WITHOUT CORRELATION TO METABOLIC DERANGEMENTS OR DEGENERATIVE CHANGES

NECROBIOSIS LIPOIDICA DIABETICORUM

First described by Oppenheim in 1929. It is the best known of the cutaneous markers of diabetes mellitus. It occurs in 0.3-0.7% of diabetics[26]. At the time of diagnosis two third of the patients have diabetes. Women are three times more commonly affected than men

with an average age of onset of 30 years in patients with diabetes. The etiology of NLD remains unknown. A link with diabetic microangiopathy has been suggested, yet the caliber of the affected vessels in NLD is usually larger than the caliber of the vessels affected in diabetes. The abnormal collagen found in necrobiosis lipoidica has invited speculation on a direct etiological relationship of NLD to the collagen itself, as a result of accelerated ageing of collagen in diabetes, abnormal collagen cross-linking, or overhydrated collagen produced in response to osmotic effects generated by the end products from the aldose reductase pathway[27].

The lesions are usually bilateral, asymptomatic occurring in the pretibial skin as irregular ovoid plaques, with violaceous indurated periphery and a yellow central atrophic area. Superficial telangiectasia and scattered

hyperkeratotic plaque may be noted. Ulceration occurs in 35% of the cases[28].

Histopathology of the skin lesion reveals neorobiotic reaction with large areas of necrobiotic collagen seen in the lower two third of the dermis.

A characteristic cellular infiltrate consisting of histiocytes, fibroblasts, lymphocytes surrounds the necrobiotic areas and adjacent fat.

Giant cells may be seen and the extracellular lipid deposits are typical and scattered between the degenerating fibres. Blood vessels shows endothelial thickening and luminal occlusion.

GRANULOMA ANNUALRE

21% of generalized GA and 10% localized GA are associated with diabetes[29]. Majority of the diabetics are insulin dependent(Type 1). IDDM patients with GA has increased prevalence of HLA B8. GA is characterized by an annular or arciform configuration of flesh-colored or pale red papules and plaques. Localised GA is most characteristically located on the dorsa of the hands and feet. Generalised GA is characterized by a symmetrical eruption of hundreds of tiny papules,

occurring all over the body surface. Mauriac's syndrome[30] is characterized by juvenile onset diabetes, stunted growth, hepatomegaly and granuloma annulare.

ACANTHOSIS NIGRICANS

Acanthosis nigricans is the skin marker of insulin resistance states characterized by velvety, verrucous, hyperpigmented plaques that have the predilection for axilla, nape of neck, infra mammary area, palms and soles[31]. Light microscopy shows hyperkeratosis, acanthosis, papillomatosis and increased pigment basal layer.

Mutation in the insulin receptor, anti bodies to insulin receptor as well as post receptor mutation causes insulin resistance leading to hyperglycaemia. Compensatory hyperinsulinaemia induced by insulin resistance activates insulin like growth factor-1 receptors on various tissues. In the skin, simulation of IGF-1 receptors on keratinocytes could lead to excessive epidermal growth.

SYNDROMES ASSOCIATED WITH INSULIN RESISTANCE AND ACANTHOSIS NIGRICANS[32]

Type A syndrome

Type B syndrome

Type C syndrome

Lawrence seip syndrome

Leprechaunism

TYPE A SYNDOME(HAIR-AN SYNDROME)[33]

The genetic defect is said to be in the insulin receptor. Predominantly seen in infancy, childhood and young female, associated with hirsuitism, masculine habitus, increased growth and polycystic ovarian disease.

TYPE B SYNDROME

Type B syndrome is due to anti insulin receptor antibody. Females are more commonly involved in the ratio of 6:1. It is associated with lupus erythematosus and Sjogrens syndrome.

TYPE C SYNDROME

Post receptor defect inhibit insulin action

LAWRENCE-SEIP SYNDROME

Lipoatrophic type of diabetes mellitus with autosomal recessive inheritance. There is complete loss of sub cutaneous fat and visceral fat before the age of 2 years. Insulin resistance diabetes mellitus develops by the age of 10 years. There is precocious enlargement of genitalia and in females marked enlargement of clitoris. Hepatomegaly, Hyperlipidemia, Hypertrichosis and excessive bone growth, Acanthosis nigricans are characteristic[34].

LEPRECHAUNISM (DONOHUE'S SYNDROME)

Leprechaunism is a rare autosomal recessive inherited syndrome characterized by severe intrauterine and postnatal growth retardation, decreased subcutaneous tissue and muscle mass, and a characteristic Elfin facies. The basis for insulin resistance is homozygous mutation in the extra cellular domain of the insulin receptor, which leads to markedly impaired insulin binding activity[35].

DIABETIC THICK SKIN (CHEIRO ARTHROPATHY)

Thickening of the skin and periarticular connective tissues of the finger results in painless limitation of joint mobility. It is demonstrated by inability to approximate the two palms with hands pressed together and fingers separated in extension called the “PRAYER SIGN”[36]. It is due to accelerated and irreversible non enzymic glycosylation of the dermal collagen by undergoing Amadori rearrangement.

FINGER PEBBLES

They are seen both in Type I and Type II diabetes mellitus. In diabetic patients with thick skin, the dorsal surfaces of the fingers develop a characteristic, minutely pebbled appearance over or near the knuckles called as ‘Huntley’s papules’ or ‘Garrods knuckle pads’[37].

DERMATOSES FREQUENT IN DIABETES

VITILIGO

Multiple endocrinopathy syndrome is associated with vitiligo, diabetes, thyroid disease and chronic mucocutaneous candidiasis. 13% of persons with auto immune polyglandular endocrinopathy, candidiasis and ectodermal dystrophy have associated vitiligo and diabetes[38].

LICHEN PLANUS

The prevalence of diabetes in patients with lichen planus varies from 1-37%. The prevalence of oral lichen planus is greater in IDDM who smoke and those with history of candidiasis and most of it was erosive lichen planus[39].

PSORIASIS

The incidence observed is 2.4% but there is no convincing association[40]. A relationship is found between abnormal glucose tolerance test and surface area involvement by psoriasis.

BULLOUS PEMPHIGOID

Bullous pemphigoid is associated with Type I diabetes mellitus. Enzymatic glycosylation of glycoprotein at the lamina lucida level acts as an antigen. 20-40% of Bullous pemphigoid have diabetes compared to 2.5% of controls[41].

PRURITUS

Persistant localized pruritus of the scalp is a sign of diabetic neuropathy and is extremely refractory to treatment[42]. Localised anogenital pruritus is often produced by candidiasis.

ACROCHORDONS

Observed in 26% of NIDDM patients. Small, soft, pedunculated lesions occur on the neck and axilla. Larger lesions are seen on the groin and thighs[39].

PERFORATING DERMATOSES

Kyrles disease, perforating folliculitis and acquired perforating dermatoses are seen in patients with diabetic nephropathy on hemodialysis. It is a chronic, usually asymptomatic disease consisting of bilateral scattered papules with horny cone shaped plugs, limited to the extensor surface of the arms, legs, buttocks[43].

MISCELLANEOUS DERMATOSES

Macular amyloid, cherry angiomas, eruptive syringomas.

NAIL CHANGES IN DIABETES MELLITUS[44]

INFECTION

Acute paronychia, chronic paronychia, onychomycosis

VASCULAR LESIONS

Pterygium unguis, pterygium inversum unguis, Beau's lines, onychohauxis.

NEUROPATHY RELATED

Trauma, reflex sympathetic dystrophy.

MISCELLANEOUS

Rosenau's depression, Leukonychia, Onychomadesis, Yellow nail syndrome.

COMPLICATIONS OF DIABETIC THERAPY

INSULIN RELATED

Many complications are due to insulin being administered intradermally rather than subcutaneously and results in local inflammation, induration, ulceration and scars[45, 46].

Idiosyncratic reaction lead to painful induration, pigmentation and keloid formation.

Local allergic response occurs (15-30 minutes) after injection as urticaria, vesiculation.

Delayed allergic response starts after 1 month of therapy and present as itchy burning erythema, induration and nodule formation.

Allergic components are due to beef, pork insulin and protamine, parabens and zinc that are commonly associated with various types of insulin preparations.

Lipoatrophy is due to local immune mediated response to injected insulin and presents as localized atrophic plaques as a result of localized loss of subcutaneous tissue[47].

Insulin induced lipohypertrophy is due to lipogenic action of insulin. It presents as soft, subcutaneous nodules with the overlying skin appearing normal.

ORAL HYPOGLYCEMIC AGENTS

Cutaneous complications are more with first generation sulfonyl urea agents[48].

Occurs within the first two months of treatment. Photosensitivity, lichenoid eruptions, eczematous eruptions, erythema nodosum, Stevens Johnson syndrome, exfoliative dermatitis. Patients develop vasomotor

erythema, flushing, tachycardia, headache,dyspnoea when chlorpropamide is taken with alcohol[49].

Among the new oral therapies, alpha glucosidase inhibitor Acarbose was recently reported to cause erythema multiforne after two weeks of therapy[50].

AIM OF THE STUDY

1. To study the prevalence of various dermatoses in the diabetic population.
2. To study the age, sex prevalence of diabetic patients with various dermatoses.
3. To compare the dermatoses in the Noninsulin dependent diabetes mellitus patients with those of the Insulin dependent diabetes mellitus.
4. To correlate the recent Glycosylated Haemoglobin level to the common infections in diabetes mellitus patients.
5. To correlate the mean duration of diabetes mellitus in years in relation to cutaneous manifestations in diabetics.
6. To study the occurrence of diabetic therapy induced complications.

MATERIALS AND METHODS

Two hundred patients with diabetes mellitus were chosen at random from those attending the OPD of Dermatology department as well as Outpatients and inpatients of Diabetology department of Government General Hospital, Chennai-3, as the study group.Study was carried out from September 2006 to October 2008. All the patients were subjected to complete and thorough dermatological examination. Apart from routine haematological investigations, fasting and post prandial blood sugar levels were done in all the patients. Specially, Glycosylated Haemoglobin levels were done in patients with evidence of various bacterial, fungal or viral infections by Ion exchange resin method. The fungal infections were confirmed by Wet mount in 10%-40% Potassium hydroxide solution. Bacterial infections were confirmed by smear examination in Gram stain and Bacterial culture. The other specific investigations include Lipid profile for cases of Xanthelasma, Eruptive Xanthoma, Biothesiometry for cases of neuropathy and computerised tomogram scan for cases of rhinocerebral mucormycosis. All the screened patients were appropriately managed.

OBSERVATIONS

Of the study population 130 (65%) were cases of NIDDM and 70 (35%) were cases of IDDM. Of the 130 patients with NIDDM 70 (53.84%) were males and 60 (46.15%) were Females and of the 70 IDDM patients 34(48.57%) were males and 36(51.42%) were females. Infections were the commonest cutaneous manifestations with prevalence of 143 (71.5%) of the study population.

They were as follows:

1. Candidiasis : 21%
2. Dermatophytes : 13.5%
3. Tinea versicolor : 10.5%
4. Erythrasma : 9.1 %
5. Mucormycosis : 1%
6. Viral infections : 2%

CANDIDIASIS

It was prevalent in 21% of the total population, with prevalence of 20.93% in NIDDM group and 42.0% in the IDDM group. In the NIDDM group, the incidence in males was 27.02% and that of females 16.32%. The age of NIDDM males ranged from 41-62 years with an average age of 49.9 years. Of them maximum number of patients were observed in the age group of 41-50 years followed by 51-60 years. The age of NIDDM females ranged from 41-55 years with the mean of 45.75 years. Balanoposthitis was the commonest type of candidiasis observed in males (60%), of whom one third had phimosis as a complication(Mean HbA1c level 8.6%). Vulvovaginitis was the commonest type of candidiasis in females (50%) with mean HbA1c level of 8.3%. Intertrigo groin was observed in 20% of the males and 25% of the females. Oral candidiasis was observed only in females with prevalence of 12.5%. Erosio interdigitalis blastomycetica was observed in 20% of the males and 12.5% of the females with mean HbA1c level of 9.1% .

TABLE-1

DISTRIBUTION OF INFECTIONS IN DIABETIC POPULATION (IN PERCENTAGE)

INFECTIONS	NIDDM		IDDM	
	MALE	FEMALE	MALE	FEMALE
CANDIDIASIS	27.02	16.32	40	44.44
DERMATOPHYTES	37	20.40	20	3.70
TINEA VERSICOLOR	10.8	16.32	10	22.22
MUCORMYCOSIS			3.33	2.77
ERYTHASMA	16.21	16.32		14.81
TRICHOMYCOSIS AXILLARIS	2.70		6.66	
KERATOLYSIS PUNCTATA		4.08		3.70
HERPES SIMPLEX		2.04		
HERPES ZOSTER	2.70			
VERRUCA VULGARIS			6.66	

TABLE-2

THE CLINICAL TYPES AND AGE/SEX DISTRIBUTION OF CANDIDIASIS IN DIABETICS

AGE Yrs	SEX	NIDDM						IDDM					
		BP	I	V	E	P	O	BP	I	V	E	P	O
21-30	M												
	F												
31-40	M							6					
	F								1	4	1	1	1
41-50	M	4	2						4		1	1	
	F			4	1		1		1	2		1	
51-60	M												
	F		2										
61-70	M				1								
	F												

M- Male F- Female

BP- Balanoposthitis
I – Intertrigo
O – Oral Thrush
P - Paronychia
E - Erosio interdigitalis Blastomycetica
V – Vulvovaginitis

In the IDDM group, candidiasis was observed in 40% of the males and 44.44% of the females. The infection was common in the age group of 31-44 years with a mean age of 38.58 years in males and 37 years in female . Balanoposthitis was the commonest clinical type of candidiasis in males (50%) with mean HbA1c level of 9.5% and vulvovaginal candidiasis was the commonest type of candidiasis in females (50%) with mean HbA1c level of 8.7%. Intertrigo groin was observed in 33.33% of males and 16.6% of females. Paronychia was observed in 8.3% of males and 16.6% of females.

Wet mount of scales in KOH showed blastospores and pseudohypae in all the cases .

DERMATOPHYTE INFECTIONS

In our study group, the overall prevalence was 13.5% with a prevalence of 23.25% in the NIDDM group and 13.2% in IDDM group.

In the NIDDM group, the incidence in males was 27.02% and that of females 20.4%. The age group of NIDDM males ranged from 47-75

years with an average age of 60.9 years. The age group of NIDDM females ranged from 52-71 yrs with an average age of 59.2 yrs. The common clinical types of infections observed in males were Tinea cruris(50%),Tinea glutealis(20%),Tinea corporis,Tinea pedis and Tinea unguim(10%) each. In females, the clinical types were Tinea cruris(40%), Tinea corporis,Tinea pedis and Tinea glutealis(20%) each.

In the IDDM group, the incidence in males was 20% and that of females 3.7%.the age groups of IDDM males ranged from 33-51 yrs with an average age of 41 yrs. The common clinical types of infections observed in males were Tinea cruris & Tinea corporis 33.3% each. Tinea pedis and Tinea glutealis(16.6%) each. Only one case Tinea cruris was observed in a 35years old IDDM female. Tinea axillaris, Tinea faciei and Tinea Capitis were not observed in our study group. The clinical type of lesion in all the Individuals were similar to that of the general population occurring as annular inflammatory lesions with scaly well defined border.

Wet mount of the skin scales and nail clippings in 10 - 40% KOH showed branching septate hyphae and arthrospores in all the cases.

TABLE-3

THE CLINICAL TYPES AND AGE/SEX DISTRIBUTIONOF DERMATOPHYTE INFECTIONS

Age Yrs	Sex	NIDDM						IDDM					
		T.cru	T.cor	T.ped	T.glut	T.ung	T.axi	T.cru	T.cor	T.ped	T.glut	T.ung	T.axi
21-30	M												
	F												
31-40	M							1			1		
	F							1					
41-50	M	2		1					2	1			
	F												
51-60	M	1						1					
	F	2		2									
61-70	M	2	1			1							
	F	2	1		1								
71-80	M				2								
	F		1										

M- male F- female
T.cru- Tinea cruris T.cor- Tinea corporis
T.ped- Tinea pedis T.glut- Tinea glutealis
T.ung- Tinea unguim T.axi- Tinea axillaris

TINEA VERSICOLOR

The prevalence of infection was 10.5% in our study. The infection was observed in 13.9% of NIDDM and 15.7% of the IDDM patients. Among the NIDDM patients, it was prevalent in 10.81% of the males

and 16.32% of the females. In males the common age group affected were 41-45 years with a mean age of 40.75 years. In females the common age group affected were 31 – 40 years with a mean age of 37.87 years. The mean HbA1c level in the NIDDM group was 7.3%.

Among the IDDM patients, it was prevalent in 10% of the males and 22.2% of the females with mean HbA1c level of 6.8%. The clinical morphology showed both hypopigmented as well as hyperpigmented well defined macules covered with fine branny scales distributed in the upper trunk, face and neck. One case of perifollicular Tinea versicolor was observed. Direct microscopic examination of the scales in 10% KOH showed short, straight, angulated, aseptate or apparently septate, hyaline hyphae with blastospores in all the cases.

MUCORMYCOSIS

Though rare, 2 cases of rhino cerebral zygomycosis were noted in our study. Both of the patients had IDDM with a mean blood glucose level of 372.5mg% (Mean HbA1c level was 13.85%)

ERYTHRASMA

The prevalence was 9.1% of the total population and was seen in 13.95% of NIDDM and 15.78% of the IDDM population. The prevalence in NIDDM males was 10.8% and 16.32% in cases of females. The age group of the individuals ranged from 34 – 50 years in both males and females with a mean age of 44 years in males and 42.5 years in females. The commonest clinical site of infection observed were axilla and groin. In the females inframammary areas and thighs were also involved. The mean glycosylated haemoglobin level was 6.8% in females and 8.1% in males.

In IDDM Patients, erythrasma was seen exclusively in females with a mean age of 42.5 years and the mean glycosylated haemoglobin level was 9%.

All the patents with erythrasma showed coral red flourescence with varying shades in wood's lamp examination and the gram stain of their skin scales showed gram positive diphtheroids.

PRIMARY BACTERIAL INFECTIONS

The prevalence was 19.76% in NIDDM and 10.5% in IDDM patients. In the NIDDM group, infection was seen in 13.51% of males and 24.4% of females. The various pyodermas encountered were furunles (4), abscess (4), Cellulitis, Erysipelas,Impetigo and hidradenitis suppurativa (2 each) and In case of males sycosis barbae and superficial folliculitis (Bockhart's impetigo)was observed in one case each.

Among the IDDM patients, infection was seen in 13.3% of males and 7.4% of females. The clinical types encountered were Bockhart's impetigo(2) furuncle(1), abscess(1), cellulitis(1), hidradenitis suppurativa(1) and Necrotizing fasciitis(1). The commonest isolates were staphylococcus aureus followed by streptococci. Other less commonly encountered infections were Keratolysis punctata in 2 cases of NIDDM female and 1 case of IDDM female, Trichomycosis axillaris in 2 cases of IDDM male and 1 case of NIDDM male.

Verruca vulgaris were observed in 2 cases of IDDM males, herpes labialis and herpes zoster was observed in a case of NIDDM female and NIDDM male respectively.

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XANTHELASMA PALPEBRARUM

It was observed in two cases of our IDDM female patients. Both the patients had normal lipid profile.

CUTANEOUS MANIFESTATIONS THAT CORRELATE WITH CHRONIC DEGENERATIVE CHANGES

NEUROPATHY

Autonomic neuropathy and sensory neuropathy were the commonest systemic complications of diabetes noted in 40% of patients in the study population. It was prevalent in 40% of NIDDM population(31.42% were males and 50% females) and IDDM Population (35.29% were males 44% were females) each. The maximum number of patients affected were in the age group of 45 – 50 years in both males and

females. The mean duration of illness was 4.4 years in males and 5.2 years in female.

Motor neuropathy in the form of hammer toes, subluxation of toes were seen in 4.5% of patients in the study population, with 3.8% in NIDDM patients and 5.7% in IDDM patients. The mean duration of illness was 4 years in both sexes of NIDDM patients. In cases of IDDM patients the mean duration were 1.5 years in males and 2 years in females.

DIABETIC FOOT ULCERS

It was seen in 1.5% of the study population . It was exclusively observed in males with prevalence of 1.4% in NIDDM and 5.8% of IDDM patients. One patient has impending gangrene necessitating amputation. In all the patient the ulcers were complicated by superadded infection.

TABLE – 4

MEAN DURATION OF DIABETES IN YEARS IN RELATION TO DIABETIC COMPLICATIONS

COMPLICATIONS	NIDDM		IDDM	
	MALE	FEMALE	MALE	FEMALE
AUTONOMIC & SENSORY NEUROPATHY	4.4	5.2	4.8	5.0
MOTOR NEUROPATHY	4.0	4.0	1.5	2.0
DIABETIC FOOT ULCER	2.0		1.5	
SCLEREDEMA DIABETICORUM	9.0			

DIABETIC DERMOPATHY

It was observed in one female IDDM patient aged 52 years. She had coexistent autonomic and sensory neuropathy

DIABETIC THICK SKIN SYNDROMES

SCLEREDEMA DIABETICORUM

It was observed in 2 cases of the study population. Both had NIDDM with an average duration of 9 years . The induration and thickening of the skin involved posterolateral aspect of neck, upper back and shoulders in both the cases. The female patient had coexistent diabetic retinopathy.

CUTANEOUS DISORDERS THAT OCCUR MORE FREQUENTLY IN DIABETICS WITHOUT CORRELATION TO METABOLIC DERANGEMENTS OR DEGENERATIVE CHANGES

ACANTHOSIS NIGRICANS

This was seen in 3.5% of our study population with a prevalence of 2.8% in NIDDM males and 13.8% in IDDM females. It was common in the flexures of neck, axilla and the knuckles. Most of them were obese

and had skin tags as associated findings. Lesions were mostly of pseudo acanthosis type.

The clinical lesions were more florid in IDDM patients. One case had hirsuitism, obesity, polycystic ovaries suggestive of HAIR – AN syndrome. Another case had coexistent Hypothyroidism.

GRANULOMA ANNULARE

It was observed in two patients with IDDM. Both the patients had generalized type of granuloma annulare, with more lesions in the sun exposed area of the trunk and dorsa of hands.

DIABETIC CHEIROARTHOROPATHY

Limitation of metacarpophalangeal and proximal interphalangeal joint movements as evidenced by “Prayer Sign” was observed in 5 cases of the study population. Most of the patients had coexistent diabetic neuropathy

DERMATOSES FREQUENTLY ASSOCIATED WITH DIABETES

VITILIGO

The overall prevalence was 2.0% of the total cases studied. It was observed exclusively in IDDM female patients in our study group. Acrofacial type of Vitiligo(2) were commonly observed than classical vitiligo(1) and mucosal vitiligo(1) . One patient had coexisting hypothyroidism and vulvovaginal candidiasis

LICHEN PLANUS

Lichen planus was observed in a single case. The patient had IDDM and oral lesions of erosive type.

PSORIASIS

Psoriasis was observed in 1.0% of our study group and was exclusively seen in NIDDM males. One patient had classical psoriasis vulgaris type

with body surface area involvement of 40% and other had palmo plantar psoriasis. Biopsy was consistent with psoriasis vulgaris.

BULLOUS PEMPHIGOID

One case of Bullous pemphigoid was observed in a female patient who had IDDM. Biospy showed subepidermal bulla with eosinophills in the bulla cavity. Tzanck smear was negative for acantholytic cells.

PRURITUS

It was prevalent in 3.5% of the total population studied and was seen in 2% of males and 1.5% of females. Anogenital pruritus was commonly observed when compared to generalised pruritus. Nearly one third of the patient had coexisting intertrigo groin or vulvovaginal candidiasis and half of the patients had diabetic neuropathy. As such pruritus localised to the scalp was not encountered in our study group.

ACROCHORDONS

They were seen in 4.5% of the our total study group .The prevalence was 6.6% in case of NIDDM females and 7.14% of NIDDM males . The lesions were commonly encountered in the flexures of neck and axilla. One female patient had a large pedunculated soft fibroma involving the inner aspect of thigh. Excision Biopsy was done and histopathological features were consistent with acrochordon.

LOCALISED CUTANEOUS AMYLOIDOSIS

It was observed in 2% of the total study group, all of them had NIDDM. The prevalence was 4.2% of NIDDM males and 1.6% of NIDDM females. The commenst clinical type of lesion encountered were lichen amyloid(3) and macular amyloid (1). Lichen amyloid was noted in the lower limb and macular amyloid in the upper arm, forearms, interscapular area in a characteristic rippled pattern.

PERFORATING DERMATOSES

They were seen exclusively in the IDDM group, one male and one female patient. They had coexisting diabetic nephropathy. The lesions were seen mainly in the extremities . Histopathological study confirmed the diagnosis of kyrle's disease.

BARRAQUER – SIMONS DISEASE (WEIR – MITCHELL TYPE)

One of our study patient had IDDM with partial lipodystrophy involving the face and upper half of the body. She had haematuria and Nephrologist opinion proved the associated Acute Glomerulo nephritis. Biopsy over the affected areas showed complete loss of adipose tissue.

One case of eruptive syringoma was noted in an IDDM female in the lower periorbital areas. Histopathology showed clear cells in addition to typical syringoma features.

CUTANEOUS COMPLICATION OF DIABETIC THERAPY

Insulin induced complications were seen in 5.7% of the 70 insulin users, of which 40 were IDDM and 30 were NIDDM patients. Keloids were seen exclusively in IDDM patients, both male and female one case each. One case of insulin injection induced lipoatrophy was noted in a 28 year old female patient with IDDM. Abscess was observed in a case of 38 year old male patient with IDDM. None of the patients had allergic reaction to insulin.

Drug induced complications like photosensitivity(3) and fixed drug eruption(2) were also encountered in our study group among the NIDDM patients on Oral hypoglycemic agents.

DISCUSSION

CUTANEOUS MANIFESTATIONS THAT ACCOMPANY GROSS METABOLIC DISTURBANCES

INFECTIONS IN DIABETICS

CANDIDIASIS

Candidiasis was the commonest infection observed in our study population (21%) as opposed to 4.5% in previous studies[60]. This high incidence can be explained by the fact that candida is the commonest opportunistic pathogen residing as normal flora in diabetic patients. In males the increased prevalence of balanoposthitis may be due to the fact that all of them were uncircumcised and an uncircumcised diabetic shows increased colonization of candida than normal persons[51] and glycosuria associated with altered glucose hemostasis cause increased carriage rate of candida in the urine[52]. The mean glycosylated haemoglobin level was 8.6% indicating poor control of glucose hemostasis over the past three months.

Intertrigo was commonly observed in the groin because of higher pH of the groin in diabetic than normal population[53]. The high pH alters the host response to candidal organisms , and in addition ,the diabetics also have decreased skin delayed hypersensitivity reaction to candida antigens[5]. Prolonged hospital stay and powerful antibiotic therapy may contribute to the greater incidence of candidiasis in IDDM patients.

The high incidence of vulvovaginitis seen in the women may be due to increased carriage rate of yeast in the anogenital region of female diabetics[54]. This is especially true in the presence of uncontrolled diabetes (mean HbA1c level 8.5%) that causes glycosuria and increased secretion of glucose in the body fluids at such high level playing a major contributing factor in the prevalence of candidiasis impairing both cell mediated immunity and neutrophil chemotaxis in diabetics accelerating the risk of candida infections[5].

DERMATOPHYTOSIS

The prevalence of dermatophytosis (13.5%) in our study was greater than the prevalence (9%) observed in a previous study[14] . The incidence

was greater in NIDDM patients than in IDDM patients. Tinea cruris was the commonest clinical type in NIDDM males and females. Among the IDDM males ,Tinea capitis and Tinea faciei were not observed in our study similar to other studies[14] . The mean gylcosylated haemoglobin level was 7.6% indicating glucose hemostasis in the fair control range.

The host response to infection was seen as well defined inflammatory annular patch with scaly borders denoting that cell mediated immunity against dermatophytosis is not altered by the severity of the disease in diabetics.

PITYRIASIS VERSICOLOR

The higher prevalence (10.5%) seen in our study could be due to associated increased sebaceous gland activity which had favoured the growth of the lipophilic yeast pityrosporum orbiculare rather than the raised blood sugar. The mean gylcosylated haemoglobin level was 6.5% indicating glucose hemostasis in the good control range.

MUCORMYCOSIS

Mucormycosis was the only systemic mycoses encountered in our study. entomophthoromycosis. Mucormycosis serves as a unique marker of diabetic ketoacidosis.

ERYTHRASMA

Erythrasma was the commonest bacterial infection seen in our study. The prevalence was 9.1% in total as opposed to 13% in previous studies[6]. The mean glycosylated haemoglobin level was 7.4% in NIDDM group and 9% in IDDM group. The infection was common in obese individual especially in the presence of hyperhidrosis seen in tropical warm climate in our part of the country. Hyperhidrosis of the axilla and neck in the diabetic person occurs in compensation to the diabetic neuropathy affecting the skin of the lower limb[56]. Diabetic sweat has got greater glucose levels than the controls[57] and corynebacterium minutissimum is a glucose fermenting organism[58] and increasingly colonizes the skin of the diabetic individuals[59]. This accounts for the increased prevalence of erythrasma in diabetics. The mean fasting blood sugar level observed in our study was 198 mg

which is close to the values of previous studies (180mg)[6] suggesting that erythrasma could be the earliest indicator of diabetes in adults before other infections were seen.

PRIMARY BACTERIAL INFECTIONS

The observation that NIDDM patients had greater prevalence of staphylococcal sepsis compared to IDDM patients may be due to the fact that they have greater colonization of staphylococci (75%) compared to normal population and the colonization depends on the glycemic control achieved in diabetics[6]. The mean blood sugar was around 250md/dl in the study group , which is the minimum blood sugar value that impairs the function of the polymorphonuclear cells that play a key role in staphylococcal sepsis[5].

VIRAL INFECTIONS

The prevalence was 2% in our study group which was close to the previous study prevalence of 2.2%[60] .

XANTHELASMA PALPEBRARUM

The prevalence was 1% in our total study group with lipid profile in the normal limit.

CUTANEOUS MANIFESTATIONS THAT CORRELATE WITH CHRONIC DEGENERATIVE CHANGES

DIABETIC NEUROPATHY

It was observed in 40% of patients in the study population which was similar to the observation of 35 – 62% in previous studies [59] . Skin is commonly affected because of the involvement of autonomic nervous system which is the first to be affected, as the micro vascular diabetic changes affect the small fibres of the nerve trunk earlier.

DIABETIC FOOT ULCER

It was seen in 1.5% of the study group which was lower when compared to previous study prevalence of 3%[60]. The higher prevalence in IDDM study group may be due to the fact that marked hyperglycemia and diabetic ketoacidosis associated with IDDM produce acute reversible motor neuropathy.

DIABETIC DERMOPATHY

The prevalence was 0.5% in our study group as opposed to the previous study prevalence of 3.5%[60] . Patient had no history of prior trauma.

SCLEREDEMA DIABETICORUM

The induration and thickening of the skin involving posterolateral aspect of neck, upper back and shoulders was observed in 2 cases of NIDDMF patients. Neither the blood sugar nor the skin induration responded to treatment during our study period.

CUTANEOUS DISORDERS THAT OCCUR MORE FREQUENTLY IN DIABETICS WITHOUT CORRELATION TO METABOLIC DERANGEMENTS OR DEGENERATIVE CHANGES

ACANTHOSIS NIGRICANS

The prevalence of this condition (3.5%) was lower than the previous reports of 13% in black women (Robert Schwartz et al, 1995). The occurrence in IDDM cases were associated with severe insulin resistance. Acanthosis nigricans related syndromes observed in our study includes HAIR – AN syndrome and hypothyroidism.

GRANULOMA ANNULARE

The prevalence of this condition was 1% in our study group as also reported in other studies[60] . Seen exclusively in the IDDM group. They had generalized type of granuloma annulare predominantly involving the sun exposed areas of trunk and upper limbs.

DIABETIC CHEIROARTHROPATHY

Prayer sign was observed in 2.5% of our study population with inability to approximate the proximal and distal interphalangeal joints of both hands.

DERMATOSES FREQUENTLY ASSOCIATED WITH DIABETES

VITILIGO

The overall prevalence was 2.0%in our study which was higher when compared to previous studies (0.5%)[60] and was observed exclusively in IDDM female patients. Acrofacial type were commonly observed than vitiligo vulgaris.

LICHEN PLANUS

Oral erosive Lichen planus was observed in 0.5% of our study group as opposed to 1% in previous studies[60] . However clinical association has to be studied with more number of patients since a Lichenoid reactions would be expected with oral hypoglycemic agents especially with sulfonyl urea drugs..

PSORIASIS

The prevalence was 1.0% in our study group which was lower when compared to previous observation (2.4%) [40].

PRURITUS

Pruritus was observed in 3.5% of our study group. The incidence of pruritus varied from 3% in one study[40] to 30% in another study[3]. Pruritus can be a manifestation of diabetic neuropathy as evidenced in our study that half of the diabetic patients with pruritus had coexisting diabetic neuropathy [20]. As such , pruritus localized to the scalp was not encountered in our study group.

ACROCHORDONS

They were seen in 4.5% of our total study group which was much lower than the previous values (46%) [58] and most of the cases were associated with obesity. The low incidence in our study proves that skin tags may not be related to the hyperglycemia or insulin resistance and were

probably related to obesity , and the occurrence of pseudoacanthosis nigricans supports this view.

LOCALISED CUTANEOUS AMYLOIDOSIS

It was observed in 2% of our study group. Most of the cases were pruritic in nature in contrast to the previous study views that amyloidosis was non pruritic in diabeties[39].

KYRLE'S DISEASE

Seen exclusively in the IDDM group and probably reflect the effect of diabetic nephropathy on the skin. The prevalence was 1% as opposed to the previous study prevalence of 0.5%[60].

CUTANEOUS COMPLICATIONS OF DIABETIC THERAPY

Allergic reaction to insulin was not observed in our study group as against the previous studies. Insulin site infection was less (1%) compared to previous studies (12.5%)[46].

Drug induced complication in the form of fixed drug eruption and photosensitivity due to first generation oral hypoglycemic agents were encountered in our study.

CONCLUSIONS

1.Infections were the commonest clinical associations observed in our studies.

2. Candidiasis , dermatophytosis and primary bacterial infections were commonly observed in NIDDM patients where as pityriasis versicolor, erythrasma and viral infections were common in IDDM patients.

3. Balanoposthitis in men and vulvovaginitis in women were the common clinical types of candidiasis observed.

4. A rare deep Mycosis, Rhinocerebral zygomycosis was encountered in two uncontrolled IDDM patient.

5. Vitiligo, Oral erosive Lichen planus, Acanthosis nigricans, Granuloma annulare were seen exclusively in IDDM group.

6. Psoriasis, Acrochordons, Localized cutaneous amyloidosis were limited only to the NIDDM group.

7. Half of the diabetic patients with Pruritus had coexisting diabetic neuropathy.

8. Kyrle’s disease exclusively accompanied IDDM patients with diabetic nephropathy.

9. Autonomic and sensory neuropathy induced complications were observed equally in NIDDM and IDDM group.

10. Motor neuropathy and its related complications like diabetic foot ulcer were encountered commonly in IDDM group.

11. Insulin induced complications like Keloid, Lipoatrophy were common in IDDM population than in NIDDM group.

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PROFORMA

NAME : OCCUPATION / INCOME

AGE : ADDRESS:

SEX :

TYPE OF DIABETES :

DURATION OF DIABETES :

TYPE OF TREATMENT :

CUTANEOUS MANIFESTATIONS IN DIABETES MELLITUS

I. THOSE ACCOMPANYING GROSS METABOLIC DISTURBANCES

1. INFECTIONS

BACTERIAL

Furunculosis

Carbuncle

Impetigo

Ecthyma

Folliculitis

Cellulitis

Erysipelas

Erythrasma

Hidradenitis suppurativa

FUNGAL

Superficial dermatophytoses

Tinea versicolor

Mucormycosis

Candidiasis

Paronychia

Intertrigo

Thrush

Balanoposthitis

Vulvovaginitis

Erosio interdigitalis blastomycetica

VIRAL

Herpes zoster

Herpes simplex

Verruca vulgaris

PARASITIC

Scabies

2. XANTHOMATOSIS

Eruptive xanthoma

Xanthelasma

Yellow skin

II. THOSE ACCCOMPANYING CHORNIC DEGENERATIVE CHANGES

MICROANGIOPATHY RELATED

Necrobiosis lipoidica diabeticorum

Diabetic dermopathy

Erysipelas like erythema

Diabetic rubeosis

Periungual telengiectasia

Diabetic foot

MOTOR NEUROPATHY RELATED

Muscle wasting

Subluxed toes

Hammer toes

Pes cavus

SENSORY NEUROPATHY RELATED

Numbness
Tingling sensation
Burning sensation
Charcots joints

AUTONOMIC NEUROPATHY RELATED

Anhidrosis
Edema foot
Corns
Callosities
Traumatic fissure

DIABETIC BULLAE

III. FREQUENT IN DM WITHOUT CORRELATION TO METABOLIC / DEGENERATIVE CHANGES

Acanthosis nigricans and related syndromes
Granuloma annulare
Pruritus
Diabetic thick skin
Finger pebbles
Vitiligo
Psoriasis

Lichen planus

Skin tags

Perforating dermatosis

IV. CUTANEOUS COMPLICATIONS OF DIABETIC THERAPY:

INSULIN RELATED

Urticaria

Keloid

Lipoatrophy

Lipohypertrophy

Localized ulceration / abcess/ induration

ORAL HYPOGLYCEMIC AGENTS RELATED

Erythema multforme

Steven Johnson syndrome

Photosensitivity

Eczematous eruptions

Erythema nodosum

SYSTEMIC EXAMINATION

INVESTIGATIONS

Hematology

TC

DC

ESR

Hb%

Blood Sugar

Blood urea

Serum creatinine

Skin biopsy

Urine analysis

Albumin

Sugar

Wet mount in 10 – 40% KOH

Wood’s lamp examination

Specific investigations

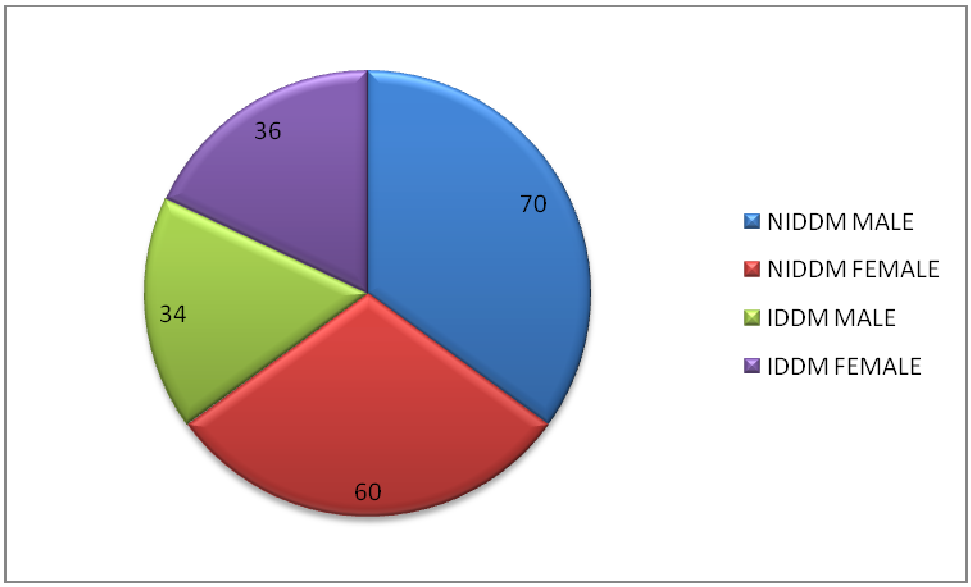
Lipid profile

Glycosylated Haemoglobin level (By Ion exchange resin method)

Endocrine Assessment

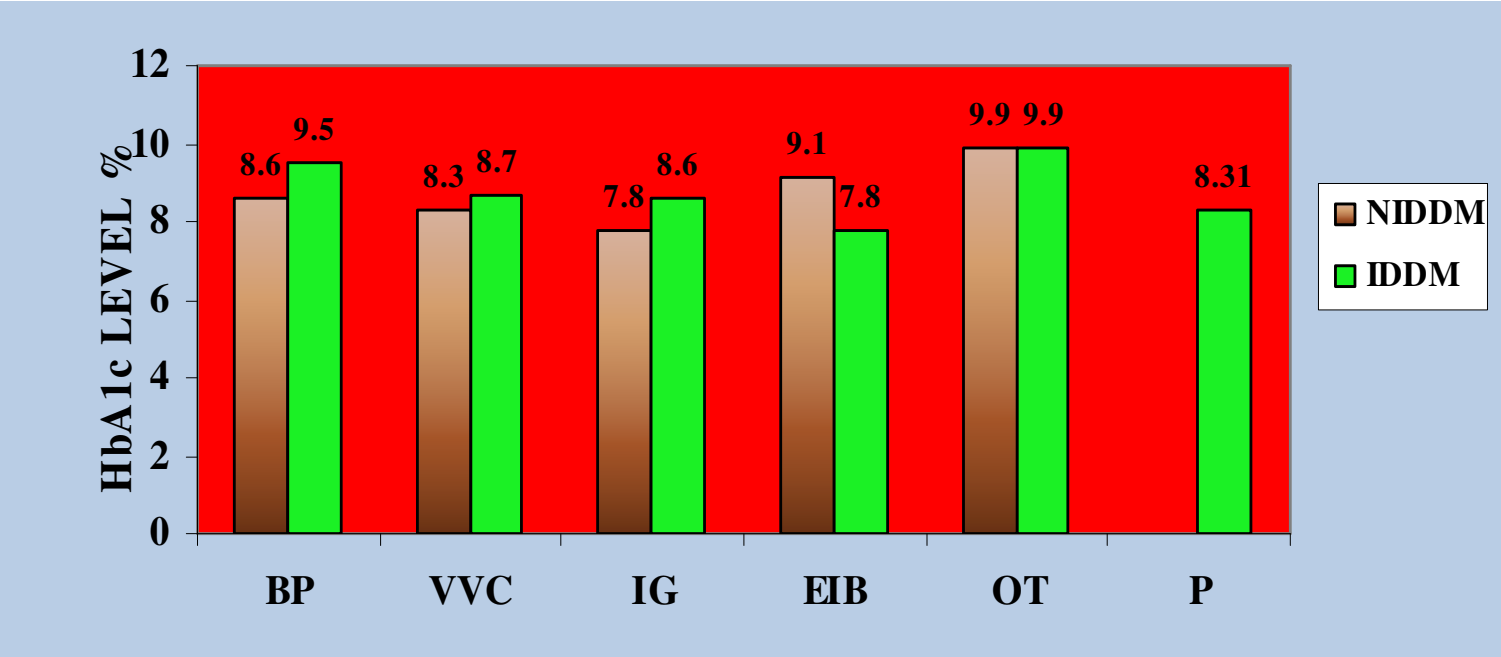
Biothesiometry.

FIG:1 SEX PREVALENCE OF NIDDM & IDDM CASES



TOTAL NUMBER OF CASES:200

FIG:2 CORRELATION OF HbA1c LEVEL TO CANDIDIASIS

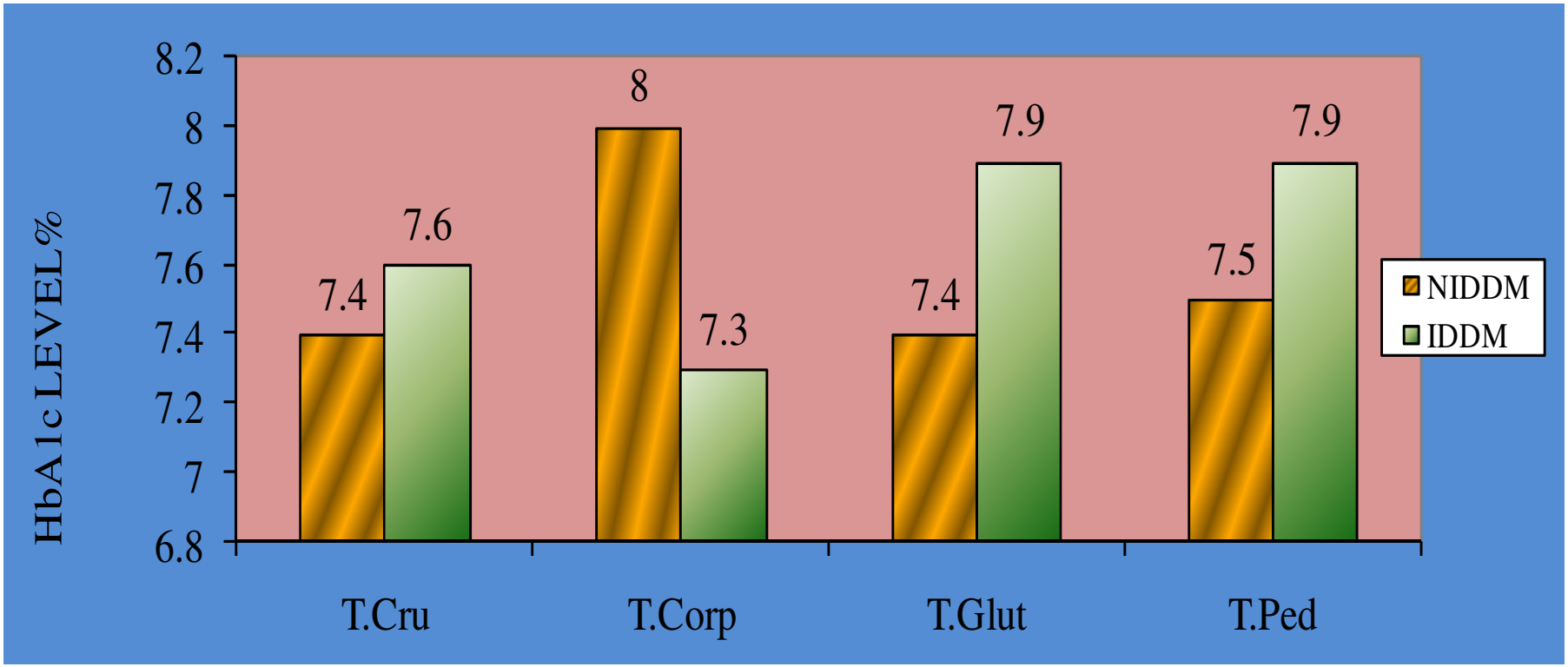


BP – Balanoposthitis
VVC – Vulvovaginal candidiasis
EIB – Erosio interdigitalis blastomycetica
P – Paronychia
IG – Intertrigo groin
OT – Oral Thrush

REFERENCE VALUES:

Normal	**: <6%**	**Fair control**	**: 7-8%**
Good control	**: 6-7%**	**Poor control**	**: >8%**

Fig 3 : CORRELATION OF HbA1c LEVEL TO DERMATOPHYTOSIS

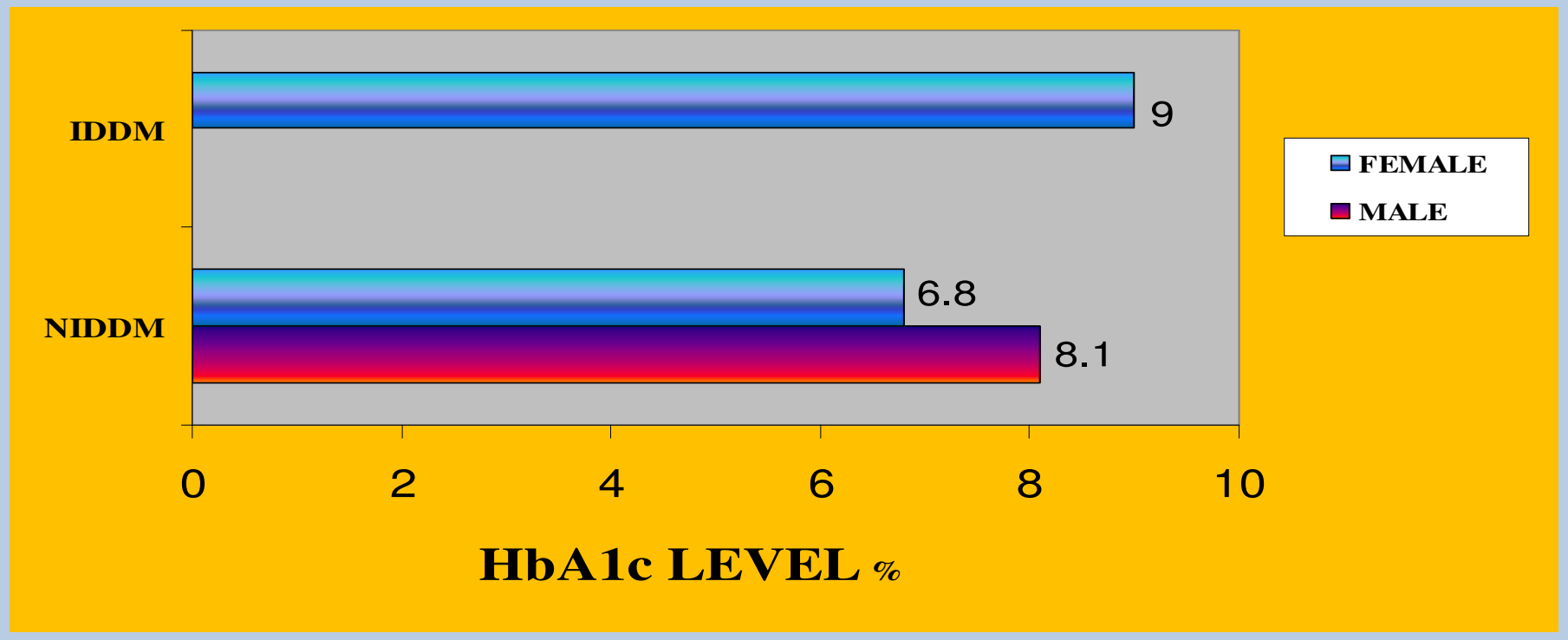


T.Cru – Tinea Crusis
T.Corp – Tinea Corporis
T.Glut – Tinea Glutealis
T. Ped – Tinea Pedis

Reference Values

Normal	**: <6%**
Good control	**:6-7%**
Fair control	**:7-8%**

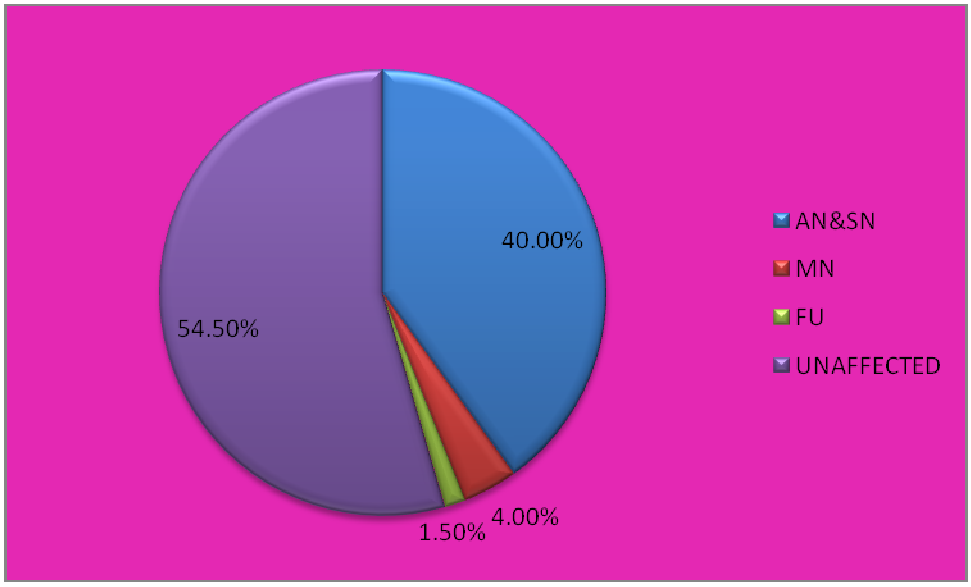
Fig 4 :CORRELATION OF HbA1c LEVEL TO ERYTHRASMA



REFERENCE VALUES:

Normal	**: <6%**	**Fair control**	**: 7-8%**
Good control	**: 6-7%**	**Poor control**	**: >8%**

FIG:5 PREVALENCE OF NEUROPATHY IN PERCENTAGE



AN & SN – Autonomic and sensory neuropathy
MN – Motor neuropathy
FU – Foot ulcer