
Erectile Dysfunction and peripheral Neuropathy in Men with type 2 Diabetes Mellitus

Isam Noori Salman AL – kirwi*
DM, CABM

Abstract

Background: Diabetic men account for the majority of patients who complains of Erectile dysfunction (ED) , more than 50% of men with diabetes mellitus suffer from ED. Compared with their non-diabetic, erectile problems affected diabetic men both with an increased prevalence and at an earlier age of onset.

Objective: To assess diabetic patients with ED and other related condition such as retinopathy, neuropathy and dyslipidemia.

Patients & Method: Sixty nine diabetic patients assessed for presence of ED, retinopathy, nephropathy and neuropathy. Scoring for neuropathy done and patients divided into mild, moderate and severe neuropathy .

Results: About sixty-five percent of patients have ED; 40.4% have neuropathy of different degrees. 14.5% with mild neuropathy and 26.1% have moderate neuropathy and 5.8% with severe neuropathy. ED more in patients with poor glycemic control. Atherogenic index increase more in patients with ED .

Conclusion: 35 -75% of patients Develop ED with linear increase in neuropathy.

ED increase with age more than 60 years.

ED increase with duration of disease (> 10 years) and more with poorly controlled diabetes (HbA1c > 9).

ED more in patients with dyslipidemia (atherogenic index>4)

Keywords: Type 2 diabetes mellitus; erectile dysfunction, dyslipidemia, neuropathy, retinopathy, neuropathy score. Atherogenic index.

Introduction

D iabetes mellitus is becoming more common in the U.S; affecting 18.2 million Americans^[1]. Chronic hyperglycemia is associated with long term damage, dysfunction and failure of multiple organ system; in particular genitourinary complication are common among diabetics, with 80% having lower urinary tract complications, 50% developing nephropathy and 35-75% developing having erectile dysfunction.^[2]

Erectile dysfunction(ED) defines as inability to attain or maintain an erection firm enough for satisfactory intercourse and adequate for the successful vaginal penetration. It may or may not be associated with impairment of libido or ejaculation.

Moderate to severe ED symptoms are reported by more than 50% of men over age of seventy.

ED can also be an early and first sign of underlying systemic (diabetes)^[3,4] or psychologic(e.g. depression) disease in young men.

ED may also present 10-15 years earlier in diabetics than in non diabetics.

ED is three times more common in diabetic men and that diabetic ED was strongly linked to glycemic control (Hb A_{1C}). Level, duration of disease (more than ten years) and the presence of diabetic complications (retinopathy, neuropathy, cardiovascular disease).^[5]

The risk of ED is made greater by poor lifestyle. Factors such as obesity and smoking with the latter having a cumulative dose dependent effect.

In men with diabetes, ED is related to somatic and psychological factors. Like diabetic ED, diabetic neuropathy is usually progressive and related to glycemic control.^[5]

Failed transmission of the neural signal to and from spinal cord result in reduced neural nitric

oxide (NO) delivery to cavernosal smooth muscle, impaired sinusoidal and endothelial cell (NO) release because of endothelial dysfunction.^[6] Reduced arterial and arteriolar inflow due to peripheral vascular disease and failure of relaxation of the corpora from glycation of the elastic fibers^[6] it should not be neglected that drug therapy (typical of diabetic polypharmacy) accounts for up to 25% of cases ED in the general population e.g. Anticholenergetic; Antihypertensive.^[7]

Patients & Method:

Sixty nine male patients attending to NDC (National Diabetic center) (Nov 2002-Apr 2005) with diabetes, age group (40-60 years) with type 2 D.M;

BMI (Body mass index) (25-30 kg/m²).

Eight treated by diet only (11.6%); fifteen on insulin (21.7%); forty one on oral agents (59.4%); five on insulin + oral agents (7.2%).

HbA^{1c} was (7.8-10.3)%.

Patients with pelvic trauma, prostatic disease, cardiovascular disease; psychological problem, alcoholic abuses were excluded from the study.

A thorough history, including the duration of ED, progression and severity of dysfunction. History of repeated nocturnal penile erection, drug history taken. Alcohol, smoking asked for.

Physical examination to assess overall health with particular attention given to cardiovascular, neurological, endocrine, genitourinary system. Blood pressure examination, genital exam for testis size, and prostate gland assessed for size by ultrasound. Ophthalmological examination for presence of retinopathy done.

Clinical examination for peripheral neuropathy, distal weakness and sensory changes and reflexes.

Patients were graded as to neuropathy severity using six symptoms score i.e. foot pain, numbness, tingling, weakness, ataxia, and upper limb symptoms all as present or absent^[8]

Eight reflexes score i.e. bilateral knee and ankle reflexes, bilateral biceps and triceps reflexes, each graded as absent, reduced or normal and five physical examination score i.e. pin prick, temperature, light touch, vibration and position sense, as present or absent.^[8]

For a total of 19 possible points, assessment of numbness and tingling in this scoring system was referable to the toes and feet.

Grading was stratified such that 0-5 indicated no neuropathy. 6-8 indicated mild neuropathy. 9-11 indicated moderate neuropathy and ≥ 12 indicated severe neuropathy.

Reflex score graded as absent= 2; reduced =1 normal =0 for each side.

Some investigations done such as complete blood count, urinalysis for presence of protein, renal function, lipid profile, fasting plasma glucose (FPG); Hb A_{1c}, thyroid function done for men with reduced sexual desire or clinical evidence of thyroid disorder.

Electromyography (EMG) study done.

Statistical analysis:

Statistical analyses were done using SPSS version 13, the statistical significance of association between 2 categorical variable was assessed by chi-square χ^2 test.

The difference in mean of a normally distributed outcome quantitative variable between 2 groups was assessed by independent sample t-test while between more than 2 groups the ANOVA test was used.

P-value less than the 0.05 level of significance was considered statistically significant.

Results

Men with diabetes (n=69) found to have increased prevalence of erectile dysfunction (n=44)(63.8%). and 40.4% have peripheral neuropathy.

ED increased with direct relation with increase in neuropathy and retinopathy.

ED increase positively with age, duration of Diabetes and HbA_{1c} level, the neuropathy score positively associated with ED(44.4%.) (Table -1-) Twenty nine patients have retinopathy and 96.6 % (n=28) of them have ED (P<0.001).

(Table -1-) Erectile dysfunction (ED) in (69) patients with type 2 diabetes mellitus.

		Presence of Erectile dysfunction (ED) in (69) patients with type2 diabetes mellitus depending on symptoms score and physical exam score		
		Negative (n = 25)	Positive (n = 44)	P- value
FPG (mg/d/)	Range	(85 – 195)	(90 – 250)	0.2
	mean \pm SD	132.6 \pm 33.5	144.4 \pm 37.6	
HbA1c %	Rang	(5.7 – 13.2)	(6 – 16.5)	< 0.01
	mean \pm SD	8.8 \pm 2.3	9.8 \pm 3.7	
TC (mg/d/)	Range	(95 -280)	(120 – 320)	< 0.001
	mean \pm SD	169.4 \pm 4.41	222.4 \pm 51.2	
TG (mg/d/)	Range	(90 – 180)	95 – 325)	< 0.001
	mean \pm SD	114.2 \pm 21.5	82.1 \pm 62.3	
LDL (mg/d/)	Range	(70 – 110)	(165 – 257)	0.049
	mean \pm SD	83.5 \pm 13.7	95.3 \pm 27.5	
HDL (mg/d/)	Range	(28 – 93)	(23 – 46)	< 0.001
	mean \pm SD	39.4 \pm 12.2	31.6 \pm 4.9	
Duration of D.M (years)	Range	(1- 8)	(1- 37)	<0.001
	mean \pm SD	2.8 \pm 2	13.9 \pm 8	
Neuropathy score	Range	(0- 4)	(0 – 12)	< 0.001
	median inter- quartile range	0	9	
		(0 – 0)	4- 9	
Atherogenic Index Chol/HDL	Range	(2.04 – 8.48)	(3.33 – 13.91)	< 0.001
	Median Inter- quartile Range	4	7.22	
		(3.33 – 5.86)	(5.21 – 8.66)	

FPG- fasting plasma glucose (mg/dl), HbA_{1c} – glyated hemoglobin (%), Tc – total cholesterol (mg /dl)

TG – triglyceride (mg/dl)

LDL – Low density lipoprotein (mg/dl)

HDL – high density lipoprotein (mg/dl)

Seventeen patients have nephropathy and 100% of them (n=17) have ED (p<0.001).

FPG range (85-195) mg/dl, mean± SD (132.6 ± 33.5) in patients with no ED and FPG (90-250) mg/dl, mean± SD (144.4 ± 37.6) in patients with ED (P=0.2)

HbA1C (6-16.5)% mean± SD (9.8± 3.7) in patients with ED (P< 0.001 HbA1C(5.7-13.2)% mean±SD(8.8±2.3)% in patient with no ED(p 0.13)

S.TC (120-320) mg/dl , means± SD (222.4 ±51.2) (p<0.001) in patients with ED. S.TC(95-280)mg/dl,mean±SD(169±44.1)mg/dl in patient with no ED(p<0.001).

STG(95-325)mg/dl, mean±SD (182.1±65.3)(p<0.001). STG(90180)mg/dl, mean±SD(114.2±21.5)mg/dl in patients with no ED.(p<0.001)

S.LDL (65-257) mg/dl means± SD (95.3±27.5)(P<0.049).SLDL(70-10)mg/dl, mean±SD(83.5±13.7) in patient with no ED.

S.HDL (23-46) mg/dl mean± SD (31.6 ±4.9) (p<0.001).SHDL(28-39)mg/dl, mean±SD(39.4±12.2) in patients with no ED.

BMI (17.7-49.1) kg/m² mean ± SD (26.1 ±6) (p<0.73).BMI (16.7-44.5)kg/m², mean's (25.5±6.6) in patients with no ED.

Duration of D.M (1-37) years mean± SD (13.9 ±8) (P<0.001),duration of D.M (1-8)years, mean's(2.8±2)in patients with no ED.

Atherogenic index(TC/ HDL) ratio (3.33-1391) (p<0.001).atherogenic index(2.04-8.48)in patients with no ED.

Discussion:

ED is present in up to 50% of men with D.M. Our result show linear increment in the prevalence of ED that is associated with a linear increase in neuropathy^[9], HbA1c^[5], duration of Diabetes^[10], Dyslipidemia^[11].The association we found between ED and neuropathy score support the fact that patient with Diabetes develop Neuropathy of small unmyelinated new Fibers leading to clinical manifestation of peripheral neuropathy^[12]. Prevalence of ED found to be increase with poorly controlled Diabetes i.e. (HbA1c> 8)and this correlate with underlying pathophysiology of ED, as elevated blood glucose level and glycation end product (AGEs) can lead to over production of free radical spelves and result in smooth muscle dysfunction. ^[13] Although the prevalence of ED in Diabetic men need to be confirmed in large epidemiological studies, In any case, the good control of plasma glucose to the target is strongly recommended in order to reduce the prevalence of ED ^[14].

Conclusion

Between 35 & 37% of diabetic patients develop ED between ages of 40 – 60 years.

Prevalence of ED associated with a liner increase in Neuropathy.

Incidence of ED increase with age and more with age(>60 years)than age 40 years and below.

Also ED increase with duration of diabetes especially if duration (> 10 years)

ED increase with poor glycemic control if(HbA1c > 9).

ED more in patients with Dyslipidemia (therogenic index > 4)

ED more in patients with neuropathy, nephropathy and Retinopathy.

Good glycemic control delays or prevents the onset of diabetic Neuropathy and then ED and ameliorate most of the symptoms in those with Neuropathy however even good glycemic control may be insufficient in some patients

References:

- 1-World Health organization, Department of Noncommunicable Disease Surveillance. Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications.Geneva:WHO,2004.
- 2-Johannes CB,Araujo AB, Feldman HA. *et al*; Incidence of erectile dysfunction in men ages 40-69: longitudinal results from the Massachusetts male aging study. *J Urol* 2000. 163: 460-463
- 3-Maatman TJ, Montague DK, Martin LM: Erectile dysfunction in men with diabetes mellitus. *Urology* 1987, 29: 589 – 592.
- 4-De Angelis L, Marfella MA, Siniscalchi M,Marino L, Nappo F, Giugliano F, De Lucia D, Giugliano D: Erectile and endothelial dysfunction in type II diabetes: a possible link. *Diabetologia* 44:1155-1160, 2001.
- 5-Romeo JH, Seftel AD, Madhun ZT, Aron DC: sexual function in men with diabetes type 2: association with glycemic control. *J Urol* 2000, 163: 788-791.
- 6-Rajfer J, Aronson WJ, Bush PA, *et al*: Nitric oxide as mediator of relaxation of the corpus cavernosum in response to nonadrenergic, noncholinergic neurotransmission. *N Engl J Med* 1992, 326:90-94.
- 7-Burnett AL, Lowenstein CJ, Brecht DS, *et al*: Nitric oxide: a physiologic mediator of penile erection. *Science* 1992, 257:401-403.
- 8-Perkins B, Olaleye D, Zimmman B, Brill V: Simple screening tests for peripheral Neuropathy in the diabetes clinic. *Diabetes Care* 24:250-256, 2001[Abstract/Free full Text]
- 9-Sтивен MJ, Feldman EL, Greene DA: The aetiology of diabetic neuropathy: the combined roles of metabolic and vascular defects. *Diabet Med* 12:566-579,
- 10-Murray FT, Johnson RD, Sciadini M *rt al*: Erectile and copulatory dysfunction in

- chronically diabetic BB/WOR rats. *Am J Physiol* 1992, 263: E151-E157.
- 11-Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults: Executive Summary of the third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation and treatment of High Blood Cholesterol in Adult (Adults285:2486-24, 2001)
- 12- Sanez de Tejada I, Goldstein I Diabetic penile neuropathy. *Urol Clin North Am.* 1988; 15:120-129.
- 13- Seftel AD, Vaziri ND, NI Z, et al. Advanced glycation end products in human penis. *urol*; 1997;50:1016-1026. FULL TEXT I 11stI PUMBED.
- 14- Tesfay S, Stevens LK, Stephenson JM, Fuller JH, Plater M, Ionescu-Tirgovist C, Nuber A, Pozza G, Ward JD: prevalence of diabetic peripheral and its relation to glycaemic control and potential risk factors: the EURODIAB IDDM Complication Study. *Diabetologia* 39:1377-1384, 1996

*National Diabetes Center (NDC), Al- Mustansiriya University