

## Erectile Dysfunction and Various Cardiovascular Risk Factors in Diabetic Males- A Continued Study

Brijesh Kumar \*, Mukesh Rana\*

\* Assistant Professor, Department Of Medicine MRA Medical College Ambedkarnagar, UP, India.

**Abstract:** Background: Erectile dysfunction is a prevalent health problem among diabetics. Presence of erectile dysfunction in diabetics mandates evaluation for coronary artery disease risk factors. Methodology: This case control hospital based study involved 102 patients evaluated for coronary artery disease risk factors by using IIEF-5 questionnaire at Upgraded P.G. Department of Medicine, M.L.N. Medical College, and SRN Hospital, Allahabad after taking informed consent and intuitional ethical committee permission. Suitable statistical tests were applied. Results: Seventy (68.3%) patients were found to have erectile dysfunction. Percentage of mild, mild to moderate, moderate and severe erectile dysfunction was 11.42, 25.71, 31.43 and 31.43 percent respectively. Age was found to be a significant determinant of erectile dysfunction in diabetics. Prevalence of hypertension was significantly higher among the cases as compared to controls. Conclusion: All diabetic males with erectile dysfunction should be intensively investigated for coronary artery disease and its risk factors. [Rana M NJIRM 2016; 7(2):100-105]

**Key Words:** Diabetes, Erectile dysfunction.

**Author for correspondence:** Dr. Mukesh Rana, Assistant Professor, Department Of Medicine MRA Medical College Ambedkar Nagar, UP, India. Email: rana\_mukesh25@yahoo.co.in

**Introduction:** Cardiovascular disease is the leading cause of death worldwide. In men, 50% of deaths due to coronary heart disease without a history of the disease. Identification of a predictive symptom or finding could allow even earlier intervention, possibly further reducing morbidity and mortality due to the disease.<sup>1</sup>

The association between erectile dysfunction(ED) and cardiovascular disease has previously been recognized. ED is a prevalent health problem and impacts considerably on the life of middle-aged men.<sup>2</sup> Because cardiovascular disease and erectile dysfunction share aetiologies as well as pathophysiology (endothelial dysfunction) and because of evidence that degree of erectile dysfunction correlates with severity of cardiovascular disease, it has been postulated that erectile dysfunction is a sentinel symptom in patients with occult cardiovascular disease.<sup>1</sup> The Massachusetts Male Aging Study emphasized the close relationship between diabetes and ED, which was three times more prevalent in diabetic subjects than their non-diabetic counterparts (28 vs. 10%).<sup>3</sup> According to National Institute of Health Consensus statement, 1992 erectile dysfunction(ED) is the persistent inability to attain and maintain a penile erection adequate for satisfactory sexual performance.<sup>4</sup> For the elderly as for others, erectile dysfunction may occur as a consequence of specific illness or due to treatment of that illness. Erectile dysfunction is often under diagnosed as patient is often reluctant or embarrassed to initiate discussion on this issue and healthcare providers often do not

specifically ask about this problem. So, the presence of erectile dysfunction in diabetics mandates workup for cardiovascular risk factors, so that subsequent cardiovascular mortality and morbidity can be reduced. With this background this study was undertaken in Upgraded P.G. Department of Medicine, M.L.N. Medical College, Allahabad to assess the Erectile Dysfunction and various Cardiovascular Risk Factors in Diabetic male patients.

**Material and Methods:** This one year case control study was undertaken in the Upgraded P.G. Department of Medicine, M.L.N. Medical College, Allahabad after taking permission from the institutional ethical committee. Informed consent was obtained from the study participants.

### Selection of Cases and controls:

Cases: Sexually active diabetic males, attending outdoor and indoor medicine department in SRN Hospital, Allahabad with complaints of erectile dysfunction.

Controls: Sexually active diabetic males without complaints of erectile dysfunction.

Exclusion Criteria: Patients with co-morbidities that might have caused erectile dysfunction, Congenital or acquired spinal, pelvic, or penile malformations and injuries; Prostate cancer; Schizophrenia and Alcohol and drug abuse wer excluded.

The diagnosis of diabetes was based on as per ADA

1997 criteria.<sup>5</sup>

Erectile dysfunction was diagnosed and stratified according to, International index of erectile dysfunction (IIEF).<sup>6</sup>

The study participants were asked to complete the International Index of Erectile Function Questionnaire (IIEF-5).<sup>7</sup>

IIEF is a widely accepted international standard for clinical trials involving sexual function, which assess four domains of sexual function by a multidimensional 15-item questionnaire. The IIEF-5<sup>7</sup> questionnaire is an abbreviated form of the IIEF, used and classify ED domain, with four items selected from the erectile domain portion of the IIEF and one addressing sexual satisfaction. The IIEF-5 as been validated and correlated with patient reports of ED. The erectile function domain score is calculated as the sum of questions 1 through 5 for men with complete answers to the IIEF-5. The degree of ED is classified by the erectile function domain score as complete (<4), severe (5 to 10), moderate (11 to 14), mild (15 to 20), or none (>21). The IIEF-5 protocol does not categorize men who fail to provide complete responses or report "no sexual activity" as a response to any of the questions on the IIEF-5 questionnaire.

Five established risk factors of coronary artery disease were taken as identified by ATP-III Guidelines.<sup>8</sup>

1. **Hypertension** : BP $\geq$ 140/90 or on anti hypertensive treatment. In diabetics BP >130/80.
2. **Dyslipidemia defined as presence of any one of following:**  
LDL>100mg/dl, Total cholesterol>200mg/dl, HDL cholesterol<40mg/dl, Triglyceride>150mg/dl
3. **Family history of premature CAD:** In males first degree relative <55 years **and** in females first degree relative <65 years
4. **Obesity defined as waist circumference:** Men $\geq$ 90 cm **and** Women $\geq$ 80 cm
5. **Cigarette smoking.**

Name, age, sex, occupation and marital status and detailed history including history of sexual activity, including IIEF questionnaire was recorded *with special emphasis on* Nocturnal or early morning erection, Situational erectile dysfunction, History of surgery on bowel bladder prostate or vascular procedures and

Complete drug history. Detailed physical examination including anthropometric measurements with special emphasis on Neurological examination and Condition of peripheral pulses was done.

Relevant Lab investigations such as Fasting and Post Prandial Blood glucose and Fasting lipid profile were done.

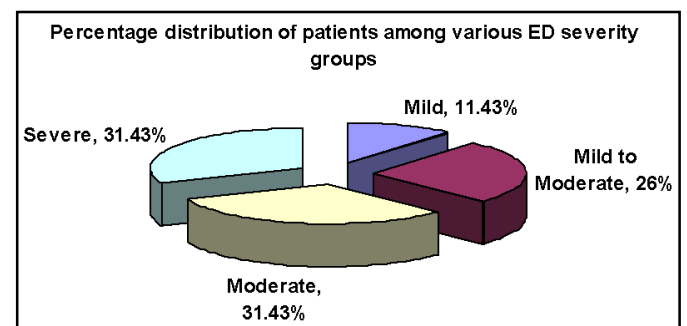
Statistical analysis: Baseline demographic and laboratory data were expressed as mean  $\pm$  standard deviation for continuous variables and as frequencies for categorical variables. Statistical inter-group differences between categorical variables were analyzed using chi-squared test and linear by linear association test, whereas inter-group comparisons between continuous variables were conducted using Student's t-test. Statistically significant difference between the comparison groups was taken as p value <.05.

## Results:

### Health problems among the aged population

Out of a total of 102 patients, 70 (68.3%) patients with erectile dysfunction (ED) and were enrolled as cases. Thirty two patients did not have ED and were classified as controls.

Among them (n=70), 22 patients (31.43%) had severe degree of erectile dysfunction (IIEF-5 score : 5-7), 22 (31.43%) had moderate grade dysfunction (IIEF-5 score : 8-11), 18(25.71%) patients had mild to moderate grade dysfunction (IIEF-5 score : 12-17), 8(11.43%) patients were suffering from mild grade of erectile dysfunction (IIEF score : 18-21).



Mean age of presentation of cases (n=70) was 53.75 $\pm$ 9.07 years. Mean age of presentation of controls was 48.06 $\pm$ 10.87 years, the difference being statistically significant (P < 0.05).

In 20-40 age group patients, out of total 13 patients,

erectile dysfunction was found in 6 patients (46.15%), in 40-60 age group patients, out of total 61 patients, 42 had erectile dysfunction (68.85%), in >60 age group, out of 28 patients, 22 patients suffering from erectile dysfunction (78.57%). The percentage prevalence of erectile dysfunction increased with the increase in age (table-1).

**Table 1 : Distribution of cases according to age group**

Age Group	Total (n)	Cases (ED)		Control (No ED)		P value
		No.	%	No.	%	
20-40	13	6	46.15	7	53.85	>0.05
40-60	61	42	68.85	19	31.15	>0.05
>60	28	22	78.57	6	21.43	>0.05

**Table 2 : Prevalence of hypertension, smoking and obesity among cases (ED) and control (No ED)**

Variables	Cases		Controls	
	No.	%	No.	%
Hypertensive	45	64.3	11	34.4
Non-hypertensive	25	35.7	21	65.6
Smokers	22	31.4	8	25
Non smokers	48	68.6	24	75
Obese	9	12.85	4	12.5
Non obese	61	87.15	28	87.5

Hypertension and erectile dysfunction: Percentage of patients with hypertension in cases was 64.3% where as prevalence of hypertension in controls was 34.4%, the difference was statistically significant (Odd's ratio = 3.43,  $\chi^2$  value =5.42 and P value= 0.02). (table 2)

Cigarette smoking and erectile dysfunction: Although, the percentage prevalence of smoker was more in cases i.e. 31.4%, than control group i.e. 25%. The association between cigarette smoking and erectile dysfunction was not statistically significant ( $\chi^2$  value 0.9295, P value >0.05). (table 2)

Abdominal obesity and erectile dysfunction: Average waist circumference of cases is 81.3±6.09 and among controls average waist circumference was 80.64±6.43, the difference being statistically significant (p <0.05). Although erectile dysfunction patients were found to

have more percentage prevalence of obesity (12.85%) than controls (12.5% only), this difference was statistically insignificant ( $\chi^2$  0.9146, p > 0.05). (table 2)

History of premature CAD in first degree relative and erectile dysfunction: In our observation, out of 70 patients, only 12 patients (17.14%) had first degree relative with premature (<55 years for male relative and <65 years for female relative) cardiovascular disease. Only 3 patient (9.37%) in control had first degree relative with such history. Although, percentage of family history of premature CAD in first degree relatives was more in cases than in controls, but the difference was statistically insignificant ( $\chi^2$  0.8975, p>0.05).

Erectile dysfunction and Dyslipidemia: Among cases, mean total cholesterol level was 189.27±62.52 and mean cholesterol level of control was 169.72±36.80, the difference being statistically significant (p<0.05). Using ATP-III criterion, percentage of patients with raised total cholesterol (total cholesterol >200 mg/dl) was 41.43% (n=29/70) whereas its prevalence among control was 34.37% (n=11/32). The difference was not statistically significant with Odd's ratio of 1.35 and p>0.05. (table 3)

**Table 3: Percent prevalence of raised total cholesterol, triglycerides and HDL among cases and controls**

Total Cholesterol	Cases		Control	
	No.	%	No.	%
Raised (>200mg/dl)	29	41.43	11	34.37
Not raised (<200 mg/dl)	41	58.57	21	65.63
LDL level				
Raised (>100mg/dl)	37	52.85	14	43.75
Not Raised (>100mg/dl)	33	47.15	56	56.25
Triglyceride level				
Raised (>150mg/dl)	29	41.43	20	62.5
Not Raised (<150mg/dl)	41	58.57	12	37.5
HDL level				
Low (<40 mg/dl)	42	60	10	31.25
Raised (>40 mg/dl)	28	40	22	68.75

The mean LDL levels of cases was found to be 109.20±44.62 and mean LDL level of control was found to be 97.17±27.39, the difference being statistically

significant ( $p < 0.05$ ).

Using ATP-III criterion, percentage of patients with raised LDL (Raised LDL  $> 100$  mg/dl) was 52.85% ( $n=37/70$ ) whereas its prevalence among control was 43.75% ( $n=14/32$ ). The difference was statistically insignificant (Odd's ratio of 1.44 and  $p > 0.050$  (table 3) The mean triglyceride level of cases was found to be  $152.42 \pm 62.5$  and mean TG level of control was  $121.67 \pm 41.47$ , the difference being statistically significant ( $p < 0.05$ ). Using ATP-III criterion, percentage of patients with raised TG (Raised TG  $> 150$  mg/dl) was 41.43% ( $n=29/70$ ) whereas its prevalence among control was 62.5% ( $n=20/32$ ). The difference was statistically insignificant with Odd's ratio of 0.42 and  $p > 0.05$ .

Mean HDL level of cases was found to be  $39.49 \pm 12.8$  and mean HDL level of control was  $44.00 \pm 9.52$ , So the difference being statistically insignificant ( $p > 0.05$ ). Using ATP-III criterion, percentage of patients with low HDL (low HDL  $< 40$  mg/dl) was 60% ( $n=42/70$ ) whereas its prevalence among control was 31.25% ( $n=10/32$ ). The difference was not statistically significant with Odd's ratio of 3.3 and  $p > 0.05$

**Discussion:** Erectile dysfunction is a prevalent problem in diabetic population. It was first regarded as a late consequence of generalized arterial disease. Contrary to this traditional view, mounting evidences suggest that erectile dysfunction is an early sign of systemic arterial disease and predictor of coronary artery disease.<sup>9-12</sup> This is because, erectile dysfunction and coronary artery disease share same risk factors. Although erectile dysfunction in diabetics is multifactorial in nature, it is vasculogenic impotence which is linked to coronary artery disease directly. Various clinical studies demonstrated that erectile dysfunction was present prior to clinically manifest CAD.<sup>9,11,1</sup> Man with no other cardiovascular symptoms, who present with erectile dysfunction should be worked up for presence of established CAD risk factors, more so, in cases of diabetics. In this study, the prevalence of erectile dysfunction was 68.63% among diabetics.

The prevalence of erectile dysfunction among the diabetic population is variable. This variability is mainly due to sensitivity and specificity of method used to assess erectile dysfunction and age group of patients. Scarce data about prevalence of erectile dysfunction

among diabetics in India is available till date.

In a recent study by **Sasaki et al.**<sup>13</sup> among 1118 Japanese diabetics using IIEF-5 questionnaire, prevalence of erectile dysfunction was found to be 90%. This high prevalence compared to our study is because of inclusion of patients of higher age group (40-79 years) in this study.

In another study using same IIEF-5 questionnaire to identify erectile dysfunction by **Hunayan et al.**<sup>14</sup> among 323 newly diagnosed diabetics in Kuwait, the prevalence was found to be 38%. The higher prevalence in our study than this one may be explained by the fact that in this study, only newly diagnosed diabetics were included and in our country; usually diabetics consult physicians quite late.

In our study, various cardiovascular risk factors were found to be variably related to erectile dysfunction.

Majority (60%) of patients were in 40-60 years age group. The percentage prevalence of erectile dysfunction was directly proportional to the increasing age and reached up to 78.57% in  $> 60$  years age group in our study.

This indicates that age is strongly associated with erectile dysfunction and a higher percentage was found in advanced age. This is similar to the observations in other population studies.<sup>2,3,14,15</sup>

In National Health and Social Life survey done in U.S. the prevalence of ED was ranged from 11% of men among 40-49 years age group to 18% of men 50-59 years of age.<sup>16</sup>

So, no statistically significant association could be made between advancing age with severity of erectile dysfunction.

The mean age in diabetic duration among cases was  $8.6 \pm 5.6$  years which was significantly higher than the control  $4.4 \pm 3.5$  and this difference was statistically significant ( $p < 0.05$ ). The mean diabetic duration in our study is comparable to other study as one done by **Kalter et al.**<sup>17</sup>

In our study, prevalence of hypertension in cases was 64.3% than control 34.4% and this difference was statistically significant.



Effect of anti-hypertensive medication on erectile dysfunction was not studied in this study as majority of hypertensive in our study were not taking any treatment and those who were, they were taking it irregularly.

In **Israel Study**<sup>15</sup>, cigarette smoking was not found to be significantly associated with erectile dysfunction, although prevalence of smoking was higher among cases. Various other studies linked cigarette smoking to erectile dysfunction,<sup>18-20</sup> but all these studies had proven that cigarette smoking induced erectile dysfunction is mainly vasculogenic type.

**Rosen et al.**<sup>19</sup> proposed that cigarette smoking is an independent risk factor in the development of atherosclerotic region in the internal pudendal arteries of young impotent man.

The failure to establish statistically significant relationship between diabetic erectile dysfunction and cigarette smoking in our study may be due to the fact that diabetic impotence is multifactorial (neural, humoral and vasculogenic).

Family history of premature coronary artery disease was found only in 17.14% of cases. Such history was found only in 9.37% of control. Although prevalence of such family history was more in patients with erectile dysfunction than control group. This difference is statistically insignificant.

Central obesity is an independent predictor of erectile dysfunction as proposed by **Riedner et al**<sup>21</sup>. Although average waist circumference among cases (81.3±6.09 cm) was more than of controls (80.64±6.43 cm), but this difference is statistically not significant.

By using obesity criteria as waist circumference >90 cm, the prevalence of obesity found among cases was 12.85% and among controls it was 12.5%. So, the association between abdominal obesity (defined as waist circumference >90 cm) and erectile dysfunction was not reached upto statistically level.

This difference may be due to the fact that sample size and characteristic of our study was not comparable to **Brazil Study**<sup>20</sup>. The percentage prevalence of abdominal obesity in our study was 0%, 11.11%, 9.09%, and 22.72% among mild, mild to moderate, moderate and severe erectile dysfunction

group respectively.

Thus it is concluded that increased waist circumference is an independent risk factor for increasing severity of erectile dysfunction.

Dyslipidemia was found to be a weak predictor of coronary artery disease in this study. The association between dyslipidemia and erectile dysfunction was not found in various previous studies as in China Study by **Thomas et al.**<sup>2</sup> Our result was also comparable to Israel Study by **Kalter et al.**<sup>17</sup> in which plasma triglyceride level was the only parameter found to be significantly associated with erectile dysfunction.

Various studies suggested that erectile dysfunction is an early sign of systemic arterial disease and predictor of coronary artery disease.<sup>6,7,19</sup>

This is based on clinical studies demonstrating that erectile dysfunction was present already prior to the clinically manifested disease.<sup>9,11,1</sup>

The largest of such studies was carried out in 8063 men who were randomized to the placebo group in the Prostate Cancer Prevention Trial.<sup>1</sup> It demonstrated a significant association between new onset as well as prevalent erectile dysfunction and subsequent coronary artery disease.

**Conclusion:** Erectile dysfunction is a significant health problem in diabetic males with prevalence reaching up to 70%. All diabetic males with erectile dysfunction should be intensively investigated for coronary artery disease and its risk factors. It is equally important to question regarding ED in all diabetic males even though the information may be difficult to obtain considering its strong correlation with CAD.

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