



Original Research Article

Erectile dysfunction: An emerging component of metabolic syndrome?

Rohit Ram¹, Sadaf Idris^{1,*}¹Dept. of Biochemistry, Rajarajeswari Medical College and Hospital, Bengaluru, Karnataka, India

ARTICLE INFO

Article history:

Received 15-03-2019

Accepted 30-05-2019

Available online 21-09-2019

Keywords:

erectile dysfunction

metabolic syndrome

risk factor

initial assessment

ABSTRACT

Objective: To evaluate the association of erectile dysfunction(ED) with risk factors of metabolic syndrome (MS).**Materials and Methods:** The study was conducted in 60 male subjects visiting the outpatient Department of Urology, out of which 30 subjects had vasculogenic erectile dysfunction evidenced by the IIEF-5 scoring system. A score of 22 and above was considered as no ED and a score of 21 and less was considered positive for ED. Participants with a known history of spinal cord/ pelvic injury, vascular surgery, multiple sclerosis, cardiac diseases, bronchial asthma, severe genital anatomic defects, chronic renal failure, liver cirrhosis, long term hypertensives, and hypogonadism were excluded. Anthropometric analysis was done. Blood pressure, height, and weight were measured. BMI was calculated. 12hour fasting blood glucose and lipid profile were measured.**Results:** The mean BMI of the cases and controls was $27.7 \pm 2.01 \text{ kg/m}^2$ and $23.2 \pm 1.88 \text{ kg/m}^2$ respectively, which was statistically significant ($p < 0.05$). 77 % of the cases were overweight and 20% were obese. A significant statistical difference ($p < 0.05$) was seen in fasting glucose, total cholesterol(TC), triglycerides(TG), low-density lipoprotein(LDL), very low- density lipoprotein(VLDL) between the two groups. The mean HDL was low in cases but no significant difference was seen ($p > 0.05$).**Conclusion:** As our study showed a positive correlation between the risk factors of MS and ED, ED should be considered as a predictive factor for a cardiac event. All men should be questioned about their sexual history and erectile function as a part of the initial assessment of cardiovascular disease risk.

© 2019 Published by Innovative Publication.

1. Introduction

Erectile dysfunction(ED) is a recurrent or consistent inability to achieve and/or maintain an erection sufficient to permit satisfactory sexual intercourse.¹⁻³ The term Erectile Dysfunction is preferred instead of impotence as ED is more specific and removes the negative feeling.⁴ ED affects more than 100 million men worldwide, with wide variability in prevalence.² The incidence of ED increases with age, reaching 20-40% in men of 60-69 years of age and 50-100% in their 70s and 80s.⁵

ED is classified as organic, psychological or mixed. Organic etiologies are vasculogenic, hormonal and neuro-genic.⁶

Vasculogenic ED has been considered as a secondary complication of diabetes, hypertension, dyslipidemia and cardiovascular disease (CVD). But growing evidence suggests that it can be used as an early marker of atherosclerosis and a precursor of systemic vascular disease.⁷ Endothelial dysfunction is common in ED and CVD.⁷ This is because the penile artery is smaller compared with the coronary artery, the same level of endothelial dysfunction causes a more significant reduction of blood flow in the erectile tissues compared to that in the coronary circulation.⁷

National Cholesterol Education Program's Adult Treatment Panel III report (ATP III), WHO and American Association of Clinical Endocrinologists (AACE) consider obesity (abdominal), hypertension, hyperglycemia/ insulin resistance and atherogenic dyslipidemia (high TG, low HDL) as the criteria for the diagnosis of Metabolic

* Corresponding author.

E-mail address: issahidris@gmail.com (S. Idris).

Syndrome.^{8,9} The role of these risk factors has also been demonstrated in CVD, but the relationship with ED is poorly documented.¹⁰ Thus ED should prompt investigation and intervention for MS/CVD.

According to studies, men with ED and no cardiac symptoms have an increased incidence of experiencing a cardiac event, both acute and chronic, in the ensuing 2-5 years, thus providing a 'window of opportunity' for risk reduction management in these patients.⁶

In the present study, we would like to measure, compare and correlate the components of metabolic syndrome between subjects with vasculogenic ED and a control group, thus consider the inclusion of ED as a component of MS.

2. Materials and Methods

With the approval of the institutional ethics committee, the study was conducted in 60 male subjects visiting the outpatient department of urology, out of which 30 subjects had erectile dysfunction as evidenced by the IIEF-5 scoring system, described by Rosen and Cappelleri in 1999.¹¹ All the participants were explained the purpose of the study and written informed consent was taken.

Detailed medical, sexual and psychological history was taken. Erectile dysfunction was diagnosed using the IIEF 5 scoring system. A score of above 22 was considered as no ED and a score of 21 and less was considered as positive for ED. Participants with a known history of antihypertensives, spinal cord/ pelvic injury, vascular surgery, multiple sclerosis, cardiac diseases, bronchial asthma, severe genital anatomic defects, chronic renal failure and liver cirrhosis, and hypogonadism were excluded.

The study group was subjected to anthropometric analysis. Blood pressure, height, and weight were measured. BMI was calculated using the formula: body weight in kilograms divided by height in meters squared. Twelve- hour fasting blood glucose and fasting lipid profile were measured in all the subjects using the enzymatic spectrophotometer.

2.1. Statistical analysis

The data collected will be analyzed statistically by computing descriptive statistics, namely mean, standard deviation, range and any significant difference between the mean values of the study group and the control group will be tested using unpaired sample student t-test.

If the p-value <0.05, the null hypothesis (there is no significant difference in the mean value between the two groups) was rejected.

3. Results

A total of 60 subjects aged 25years to 70 years were enrolled in the study, out of which 30 subjects had erectile dysfunction (IIEF score ≤ 21)

The mean age between cases (45.76 ± 14.54) and controls (44.1 ± 12.22).

The mean BMI of the cases and controls were 27.7 ± 2.01 kg/m² and 23.2 ± 1.88 kg/m² respectively, which was found to be statistically significant ($p < 0.05$). 77 % of the cases are in the overweight group (BMI 25 – 29.9kg/m²) and 20% of the cases are in the obese group (BMI ≥ 30 kg/m²) (Table 1)

The mean SBP of the cases and controls was 132 ± 18 mm of Hg and 128 ± 12 mm of Hg respectively, and the mean DBP of the cases and controls was 83 ± 4 and 81 ± 7 mm of Hg, respectively. Higher mean SBP and DBP were recorded in cases compared to controls but the difference in mean blood pressures between the two groups is not statistically significant ($p > 0.05$). 93% of the cases were pre -hypertensive and 7% of the cases were hypertensive. (Table 2)

On comparing biochemical parameters such as fasting glucose, total cholesterol (TC), triglycerides (TG), low-density lipoprotein (LDL), very low- density lipoprotein (VLDL), there was a significant statistical difference ($p < 0.05$) between cases and controls. Lower mean HDL was recorded in cases compared to controls, but the difference in mean HDL between the two groups was not statistically significant ($p > 0.05$) (Table 3)

4. Discussion

The normal male sexual function requires a complex interaction of vascular, neurological, hormonal and psychological systems. The initial obligatory event is - acquisition and maintenance of an erect penis, which is a vascular phenomenon.¹² The blood vessels of the penis are narrower in diameter, so the blood flow is restricted sooner by atherosclerosis.⁵ Thus ED is considered as a manifestation of vascular disease which in turn is associated with CVD/MS.

A study out of the University of California, San Francisco reviewed 100 men under the age of 40, who had ED, and determined that only 13% had exclusively psychogenic ED. These findings have raised awareness within the urology community and suggested that men with sexual dysfunction should be subjected to proper evaluation¹³

In this study, an attempt has been made to compare the components (diagnostic criteria) of metabolic syndrome between subjects with vasculogenic ED and a control group.

Obesity and dyslipidemia are commonly associated with a recognized risk for the development of Metabolic Syndrome (MS) which is a complex of high blood pressure, elevated glucose, cholesterol, and TG levels and low HDL-C. In our study, we found that the BMI values in the cases were significantly higher than in the control group ($p < 0.001$). This correlates with a study done by and R.Ramirez et al,² Maseroli E et al¹⁴ and D. Kalka et al¹⁵ who concluded ED is associated with obesity.

Table 1: Sample distribution according to BMI

BMI	Cases		Controls		Total
		%		%	
<18.5 Underweight	0	0	0	0%	0
18.5–24.9 Healthy	1	3%	15	50%	16
25.0–29.9 Overweight	23	77%	15	50%	38
30.0–34.9 Obesity	6	20%	0	0	06
Total	30		30		60

Table 2: Sample distribution according to blood pressure

	SBPMm of Hg	Cases		Controls		DBP Mm of Hg	Cases		Controls	
			%		%			%		%
Normal	<120	0	0	7	23	<80	6	2%	13	43%
Pre-HTN	120-139	28	93%	23	77%	80-89	24	80%	17	57%
HTN	>140	2	7%	0	0%	>90	0	0	0	0%
Total		30		30			30		30	

Table 3: Comparison of biochemical results of study subjects

	Case mean $\pm$ sd	Control mean $\pm$ sd	p-value
BMI	27.7 $\pm$ 2.01	23.2 $\pm$ 1.88	0.001**
SBP and DB	132 $\pm$ 18	128 $\pm$ 12	>0.05
	83 $\pm$ 4	81 $\pm$ 7	
Glucose	137 $\pm$ 17	101 $\pm$ 15	0.001**
TC	184 $\pm$ 39	161 $\pm$ 28	<0.05*
TG	148 $\pm$ 33	129 $\pm$ 29	<0.05*
LDL	124 $\pm$ 22	110 $\pm$ 27	<0.05*
VLDL	31 $\pm$ 9	26 $\pm$ 6	<0.05*
HDL	43 $\pm$ 8	46 $\pm$ 9	>0.05

* Statistically significant.

** Strongly significant

Hypercholesterolemia leads to the impairment of the endothelium-dependent relaxation in smooth muscle cells of the corpus cavernosum, thus resulting in ED. Wei et al was the 1st to report an independent contribution of serum lipid profile in ED where the authors stated that high TC and low HDL-C are important risk factors for ED.¹⁶ Our study showed a statistical significance between cases and controls with respect to serum levels of total cholesterol, triglycerides, LDL and VLDL ($p < 0.05$) but no statistically significant difference was found between both the study groups with respect to HDL ($p > 0.05$). This was in consistence with a study by F Yao et al,¹⁷ G Corona et al¹⁸ and DI Feldman et al.¹⁹

Several recent studies disclose that erectile dysfunction is the result of hypertension as well as the side effect of antihypertensive drugs. Studies by F Yao et al,¹⁸ DI Feldman et al¹⁹ and Ma et al²⁰ showed a significant correlation between ED and Systolic Blood pressure (SBP) only, whereas a study by Arto Heikkilä et al²¹ showed a significant correlation between ED and diastolic Blood

pressure (DBP). In our study higher mean SBP and DBP were recorded in cases compared to controls, but this difference was not statistically significant ($p > 0.05$). 93 % of the cases were pre-hypertensive. The reason for non-correlation could be that we have excluded patients on antihypertensive drugs which were not excluded in the studies showing significant correlation.

Diabetes mellitus is one of the most common chronic diseases in nearly all countries. Hyperglycemia, which is the main determinant of vascular and microvascular diabetic complications, may participate in the pathogenic mechanisms of sexual dysfunction in diabetes. In our study, we found that fasting blood glucose values in the cases were significantly higher than in the control group ($p < 0.05$). This was consistent with the study by Kaan Bal et al,⁸ Maseroli E et al¹⁴ and DI Feldman et al.¹⁹

5. Conclusion

For many years, ED was thought to be of psychological origin. Men's sexual health is considered a taboo topic in

society. The patient usually does not volunteer their ED complaints.

The ED assessment process is not an integral part of a regular case examination. Our study showed a positive correlation between the risk factors of MS and ED thus making ED as an emerging predictive factor for a cardiac event. All men should be questioned about their sexual history and erectile function as a part of the initial assessment of cardiovascular disease risk. Hence ED should be used as a clinical tool for early identification of men with MS/CVD.

6. Source of Funding

None.

7. Conflict of Interest

None

References

1. Ponnholzer A, Temml C, Rauchenwald M, Madersbacher S. Vascular risk factors and erectile dysfunction in a cohort of healthy men. *Int J Impot Res.* 2006;18:489–93.
2. Ramirez R, Pedro-Botet J, Garcia M, Corbella E, Merino J, et al. Erectile dysfunction and cardiovascular risk factors in a Mediterranean diet cohort. *Intern Med J.* 2016;46:52–6.
3. Nikoobakht M, Pourkasmaee M, Nasseh H. The Relationship between Lipid Profile and Erectile Dysfunction. *Urol J.* 2005;2:40–4.
4. Tanhuimeng. Clinical Practical guide in Erectile Dysfunction. .
5. Gandaglia G. A systematic review of the association between erectile dysfunction and cardiovascular disease. *Eur Urol.* 2014;65:968–78.
6. Vlachopoulos C, Jackson G, Stefanadis C, Montorsi P. Erectile dysfunction in the cardiovascular patient. *Eur Heart J.* 2013;34:2034–46.
7. Billups KL, Bank AJ, Padma-Nathan H, Katz S, Williams R. Erectile dysfunction is a marker for cardiovascular disease: results of the minority health institute expert advisory panel. *J Sex Med.* 2005;2(1):40–52.
8. Bal K. Prevalence of metabolic syndrome and its association with erectile dysfunction among urologic patients: metabolic backgrounds of erectile dysfunction. *Urology.* 2007;69:356–7.
9. Grundy SM. Definition of Metabolic Syndrome: Report of the National Heart, Lung, and Blood Institute/American Heart Association Conference on Scientific Issues Related to Definition. *Arterioscler Thromb Vasc Biol.* 2004;24(2):13–8.
10. Roumegure T. Erectile dysfunction is associated with a high prevalence of hyperlipidemia and coronary heart disease risk. *Eur Urol.* 2003;p. 44355–359.
11. Rosen RC. Development and evaluation of an abridged 5 item version (IIEF - 5) as a diagnostic tool for erectile dysfunction. *Int J Impot Res.* 1999;11:319.
12. Chu VN, Edelman SV. Diabetes and Erectile Dysfunction. *Clin Diabetes.* 2001;19(1):45–7.
13. Papagiannopoulos D, Khare N, Nehra A. Evaluation of young men with organic erectile dysfunction. *Asian J Androl.* 2015;17(1):11–16.
14. Maseroli E. Prevalence of endocrine and metabolic disorders in subjects with erectile dysfunction: A comparative study. *J Sex Med.* 2015;12(4):956–65.
15. Kalka D. Modifiable risk factors for erectile dysfunction: an assessment of the awareness of such factors in patients suffering from ischaemic heart disease. *Int J Impot Res.* 2016;28(1):14–9.
16. Wei M. Total cholesterol and high density lipoprotein cholesterol as important predictors of erectile dysfunction. *Am J Epidemiol.* 1994;140(10):930–7.
17. Yao F. Subclinical endothelial dysfunction and low-grade inflammation play roles in the development of erectile dysfunction in young men with low risk of coronary heart disease. *Int J Androl.* 2012;35(5):653–9.
18. Corona G. High Triglycerides Predicts Arteriogenic Erectile Dysfunction and Major Adverse Cardiovascular Events in Subjects With Sexual Dysfunction. *J Sex Med.* 2016;13(9):1347–8.
19. Feldman DI. Subclinical Vascular Disease and Subsequent Erectile Dysfunction: The Multiethnic Study of Atherosclerosis (MESA). *Clin Cardiol.* 2016;39(5):291–8.
20. RC M. Erectile dysfunction predicts coronary heart disease in type 2 diabetes. *J Am Coll Cardiol.* 2008;51(21):2045–50.
21. Heikkila. Relationship of Blood Pressure and Erectile Dysfunction in Men Without Previously Diagnosed Hypertension. *J Sex Med.* 2017;14(11):1336–41.

Author biography

Rohit Ram Undergraduate Student

Sadaf Idris Assistant Professor

Cite this article: Ram R, Idris S. Erectile dysfunction: An emerging component of metabolic syndrome?. *Int J Clin Biochem Res* 2019;6(3):401–404.