



The association between CHA₂DS₂-VASc score and erectile dysfunction: a cross-sectional study

Dilay Karabulut¹, Umut Karabulut², Fatma Nihan Çağlar¹, Mithat Ekşi³, Mustafa Gürkan Yenice³, Ekrem Güner³, Esra Dönmez İşler¹, Ersan Oflar¹, Ali İhsan Taşçıl³, Faruk Aktürk¹

¹ Department of Cardiology, Istanbul Bakırköy Dr.Sadi Konuk Educational and Training Hospital, Istanbul, Turkey; ² Department of Cardiology, Istanbul, Acibadem International Hospital, Istanbul, Turkey; ³ Department of Urology, Istanbul Bakırköy Dr. Sadi Konuk Educational and Training Hospital, Istanbul, Turkey

ABSTRACT

Purpose: This study aims to assess the association between CHA₂DS₂-VASc score and erectile dysfunction in patients who were admitted to cardiology outpatient clinics.

Materials and methods: One hundred and two male patients who were admitted to the cardiology outpatient clinic were included to the study. Erectile dysfunction was evaluated in the urology outpatient clinic in the same hospital and scored using Turkish Version of The International Index of Erectile Function. CHA₂DS₂-VASc score was calculated for every patient using the current associated guidelines.

Results: There was a negative correlation between The International Index of Erectile Function score and CHA₂DS₂-VASc score, age, hypertension, heart failure, diabetes mellitus, stroke respectively. Smoking and dislipidemia were not correlated with The International Index of Erectile Function score (p>0.05).

Conclusion: CHA₂DS₂-VASc score can be used to detect Erectile dysfunction in patients who are admitted to the cardiology outpatient clinics.

ARTICLE INFO

Mithat Ekşi

<https://orcid.org/0000-0003-1490-3756>

Keywords:

Erectile Dysfunction; Vasectomy; Vas Deferens

Int Braz J Urol. 2019; 45: 1204-8

Submitted for publication:
February 01, 2019

Accepted after revision:
June 09, 2019

Published as Ahead of Print:
August 20, 2019

INTRODUCTION

Erectile dysfunction (ED) is defined as the inability to achieve or maintain an erection long enough to engage in sexual intercourse, affecting approximately 18% to 40% of men, aged 20 years and older (1, 2). In many cases, a single cause of ED is not easy to determine, and ED is more of a result of several overlapping conditions, such as anatomical patholo-

gies, genetics, systemic disorders, lifestyle, and environment (3).

ED and cardiovascular disease (CVD) are considered two manifestations of the same systemic disorder because they share similar risk factors and pathophysiologies. Nevertheless, in a significant number of patients with CVD, ED is also observed, which is believed to be associated with alterations of vascular system, endothelial dysfunction, inflammation, oxidative and emotional

stress or sympathetic activation (4-7). Another factor strongly associated with ED is the limitation of the blood flow in penile arteries caused either by obstruction associated with atherosclerosis or by microthrombi (3).

CHADS₂ and CHA₂DS₂-VASC scores are simple risk assessment schemes for thromboembolic stroke risk. CHADS₂ was developed by investigators of stroke prevention in atrial fibrillation (SPAF) trial and includes stroke risk factors like, recent heart failure (HF), hypertension (HT), age >75 years, Diabetes Mellitus (DM) and history of stroke or transischemic attack (TIA) (8). These two risk scores are most widely used to assess the severity of thrombotic changes and the risk of thrombosis in atrial fibrillation (AF) patients (9, 10). Both scores are not only predictive of thromboembolic stroke risk, but also associated with adverse vascular function, CVD risk, and total death in the whole AF population (11-13). Although the prediction of ED is not the primary aim of the CHA₂DS₂-VASC score, its components such as older age, DM, HT, HF, and prior vascular disease are all important prognostic factors for endothelial dysfunction. Based on this knowledge, in this study, we aimed to assess the relationship between CHA₂DS₂-VASC score and ED in patients who were admitted to cardiology outpatient clinics.

MATERIALS AND METHODS

One hundred-two male patients, older than 18 years-old, who were admitted to the Bakırköy Dr. Sadi Konuk Research and Training Hospital cardiology outpatient clinic were included into the study. Patient's demographic and clinical characteristics were recorded ED of patient was evaluated in urology outpatient clinic in the same hospital.

Patients were excluded from the study if they had: a history of prostatectomy or other procedures associated with a loss of sexual function, current use of phosphodiesterase type 5 (PDE-5) inhibitors, and beta blockers.

ED was evaluated using by Turkish Version of The International Index of Erectile Function (IIEF) with 5 questions (14). It is a self-administered

questionnaire which patient's responses are based on their experience during the last 4 weeks, and is scored on a 5-point Likert scale; lower values represent poorer sexual function. Total scores are classified as: 22-25: No ED, 17-21: Mild ED 12-16: Mild to moderate ED 8-11: Moderate ED 5-7: Severe ED (15). This questionnaire provides data on ED with 98% sensitivity and 88% specificity (16).

CHA₂DS₂-VASC scores were calculated for every patient based on predefined point systems according to the current guidelines for scoring and diagnosing all mentioned conditions. In the CHA₂DS₂-VASC score, 2 points were assigned if a patient had a history of stroke or TIA or was ≥75 years of age. One point was assigned for the age 65-74 years, female sex, history of HT, DM, recent HF, and vascular disease (history of myocardial infarction, presence of complex aortic plaque, or peripheral artery disease) (8, 17).

According to their CHA₂DS₂-VASC score, the patients were divided into two groups: group 1: 0-3 points; group 2: ≥3.

In accordance with the Declaration of Helsinki, the study protocol was approved by the Regional Ethics Committee. Before the study entry, a written informed consent was obtained from every study participant.

Statistical analysis

SPSS 22.0 (IBM Corporation, Armonk, New York, United States) program was used for variable analyses. All data were analyzed for normality of distribution using the Kolmogorov-Smirnov test. Continuous variables were summarized as mean±standard deviation (SD). Pearson and Spearman correlation test was used to evaluate the correlation between the parameters. P value <0.05 was considered statistically significant.

RESULTS

The clinical and demographic data of the patients are summarized in Table-1. There was a negative correlation between IIEF score and CHA₂DS₂-VASC score, age, HT, HF, DM, stroke respecti-

Table 1 - The clinical and demographic data.

	Minimum	Maximum	Mean	Std.
Age (year)	28	76	52.8	10.7
Height (cm)	158	185	171.6	5.4
Weight (kg)	55	170	80.7	13.8
BMI (kg/m ²)	21	55.5	27.3	4.4
IIEF	5	25	15.1	5.1
CHA ₂ DS ₂ -VASC	1	6	2.1	1.1

STD = Standart deviation; **BMI** = Body Mass Index; **IIEF**: International Index of Erectile Function

vely ($r=-0.652$, $p=0.00$, $r=-0.484$ $p=0.00$ $r=-0.414$, $p=0.00$, $r=-0.278$, $p=0.007$, $r=-0.241$, $p=0.019$, $r=-0.241$ $p=0.018$). However, smoking and dislipidemia were not correlated with patients' IIEF score ($p > 0.05$) (Table-2).

When patients were divided into 2 groups according to the CHA₂DS₂-VASC scores, the mean IIEF score was 17.76 ± 4 , 29 in group 1 ($n=55$) and 11.98 ± 4 , 21 in group 2 ($n=47$) respectively. In the group of patients with CHA₂DS₂-VASC score 3 and above IIEF scores were found significantly lower ($p=0.014$).

DISCUSSION

In this study we found a inverse correlation between IIEF score and CHA₂DS₂-VASC, age, HT, CHF, DM, stroke respectively and smoking and dislipidemia were not correlated with patient's IIEF scores.

The CHA₂DS₂-VASC score was initially developed for stroke risk stratification in patients with AF. However, it has recently been applied to different clinical conditions. For example, it has been used to estimate the risk of stroke and the

Table 2 - Correlation between IIEF score and clinical parameters.

		IIEF
Hypertension	Pearson Correlation	-0.414**
	Sig. (2-tailed)	0.000
Congestive Heart Failure	Pearson Correlation	-0.278**
	Sig. (2-tailed)	0.007
Diabetes Mellitus	Pearson Correlation	-0.241*
	Sig. (2-tailed)	0.019
Stroke	Pearson Correlation	-0.241*
	Sig. (2-tailed)	0.018
Age	Pearson Correlation	-0.484**
	Sig. (2-tailed)	-0.000

* means $p < 0.005$; ** means $p < 0.001$; **IIEF: International Index of Erectile Function

development of thromboembolism inpatients with heart failure who are in sinus rhythm (18). It has also been used to estimate the risk of stroke following by-pass surgery and stroke without AF in the general population (18-20). Although the prediction of erectile dysfunction is not the primary aim of the CHA₂DS₂-VASC score, its components such as older age, DM, HF, and prior vascular disease are all important prognostic factors for endothelial dysfunction.

The association between ED and CVD, particularly coronary artery disease (CAD), has been demonstrated in previous studies (21, 22). In a meta-analysis of a prospective cohort study, ED was significantly and independently associated with an increased risk of 48% for CVD, 46% for CAD, 35% for stroke, and 19% for all-cause mortality (21). Montorsi et al. proposed that atherosclerosis affects all major vascular beds equally, including penile and coronary arteries (23). Another explanation for the association between ED and CVD is inflammation and endothelial dysfunction (24-26). Vlachopoulos et al. demonstrated that low-grade subclinical inflammation affected endothelial function and led to a prothrombotic including von Willebrand factor, tissue plasminogen activator, and fibrinogen in individuals with or without CVD (26). The relationship between ED and CVD is complex, and ED and CVD should be considered two clinical manifestations of the same systemic disorder (27).

On the other hand, in this study, it has been shown that the frequency of ED is increased in patients with high risk of CVD. We think that male patients who are admitted to the cardiology clinics do not express their complaints about ED. Therefore, it may be important to refer patients with high CHA₂DS₂-VASC score to urology outpatient clinics for early diagnosis of ED.

The cross-sectional design of the study and the number of patients are considered to be important limitations of this study, however to our knowledge this is the first study which evaluates the ED with CHA₂DS₂-VASC score in patients without AF.

In conclusion, we postulated that CHA₂DS₂-VASC score can be used to detect the ED in patients who are admitted to the cardiology departments.

CONFLICT OF INTEREST

None declared.

REFERENCES

- Selvin E, Burnett AL, Platz EA. Prevalence and risk factors for erectile dysfunction in the US. *Am J Med.* 2007;120:151-7.
- Shaeer O, Shaeer K. The Global Online Sexuality Survey (GOSS): the United States of America in 2011. Chapter I: erectile dysfunction among English-speakers. *J Sex Med.* 2012;9:3018-27.
- Heaton JP, Adams MA. Causes of erectile dysfunction. *Endocrine.* 2004;23:119-23.
- Keskin K, Sezai Yildiz S, Çetinkal G, Aksan G, Kilci H, Çetin Ş, et al. The Value of CHA(2)DS(2)VASC Score in Predicting All-Caus Mortality in Patients with ST-Segment Elevation Myocardial Infarction Who Have Undergone Primary Percutaneous Coronary Intervention. *Acta Cardiol Sin.* 2017;33:598-604.
- Azadzi KM, Goldstein I. Erectile dysfunction due to atherosclerotic vascular disease: the development of an animal model. *J Urol.* 1992;147:1675-81.
- Azadzi KM, Saenz de Tejada I. Hypercholesterolemia impairs endothelium-dependent relaxation of rabbit corpus cavernosum smooth muscle. *J Urol.* 1991;146:238-40.
- Solomon H, Man JW, Jackson G. Erectile dysfunction and the cardiovascular patient: endothelial dysfunction is the common denominator. *Heart.* 2003;89:251-3.
- Gage BF, Waterman AD, Shannon W, Boehler M, Rich MW, Radford MJ. Validation of clinical classification schemes for predicting stroke: results from the National Registry of Atrial Fibrillation. *JAMA.* 2001;285:2864-70.
- Camm AJ, Lip GY, De Caterina R, Savelieva I, Atar D, Hohnloser SH, et al. ESC Committee for Practice Guidelines (CPG). 2012 focused update of the ESC Guidelines for the management of atrial fibrillation: an update of the 2010 ESC Guidelines for the management of atrial fibrillation. Developed with the special contribution of the European Heart Rhythm Association. *Eur Heart J.* 2012;33:2719-47. Erratum in: *Eur Heart J.* 2013;34:790. *Eur Heart J.* 2013;34:2850-1.
- European Heart Rhythm Association; European Association for Cardio-Thoracic Surgery, Camm AJ, Kirchhof P, Lip GY, Schotten U, Savelieva I, Ernst S, et al. Guidelines for the management of atrial fibrillation: the Task Force for the Management of Atrial Fibrillation of the European Society of Cardiology (ESC). *Eur Heart J.* 2010;31:2369-429. Erratum in: *Eur Heart J.* 2011;32:1172.

11. Chan YH, Yiu KH, Lau KK, Yiu YF, Li SW, Lam TH, et al. The CHADS2 and CHA2DS2-VASc scores predict adverse vascular function, ischemic stroke and cardiovascular death in high-risk patients without atrial fibrillation: role of incorporating PR prolongation. *Atherosclerosis*. 2014;237:504-13.
12. Ntaios G, Lip GY, Makaritsis K, Papavasileiou V, Vemmos A, Koroboki E, et al. CHADS₂, CHA₂S₂DS₂-VASc, and long-term stroke outcome in patients without atrial fibrillation. *Neurology*. 2013;80:1009-17.
13. Hryniewicz-Szymanska A, Dluzniewski M, Platek AE, Szymanski FM, Syska-Suminska J, Klos-Szadryn A, et al. Association of the CHADS2 and CHA 2DS 2-VASc scores with left atrial enlargement: a prospective cohort study of unselected atrial fibrillation patients. *J Thromb Thrombolysis*. 2015;40:240-7.
14. Turunc T, Devenci S, Guvel S, Peksiroglu L. Uluslararası Cinsel İşlev İndeksinin 5 Soruluk Versiyonunun (IIEF-5) Türkçe Geçerlilik Çalışmasının Değerlendirilmesi. *Türk Üroloji Dergisi*: 2007;33:45-9.
15. Rosen RC, Cappelleri JC, Smith MD, Lipsky J, Peña BM. Development and evaluation of an abridged, 5-item version of the International Index of Erectile Function (IIEF-5) as a diagnostic tool for erectile dysfunction. *Int J Impot Res*. 1999;11:319-26.
16. Rosen RC, Riley A, Wagner G, Osterloh IH, Kirkpatrick J, Mishra A. The international index of erectile function (IIEF): a multidimensional scale for assessment of erectile dysfunction. *Urology*. 1997;49:822-30.
17. Lip GY, Nieuwlaat R, Pisters R, Lane DA, Crijns HJ. Refining clinical risk stratification for predicting stroke and thromboembolism in atrial fibrillation using a novel risk factor-based approach: the euro heart survey on atrial fibrillation. *Chest*. 2010;137:263-72.
18. Melgaard L, Gorst-Rasmussen A, Lane DA, Rasmussen LH, Larsen TB, Lip GY. Assessment of the CHA2DS2-VASc Score in Predicting Ischemic Stroke, Thromboembolism, and Death in Patients With Heart Failure With and Without Atrial Fibrillation. *JAMA*. 2015;314:1030-8.
19. Biancari F, Asim Mahar MA, Kangasniemi OP. CHADS2 and CHA2DS2-VASc scores for prediction of immediate and late stroke after coronary artery bypass graft surgery. *J Stroke Cerebrovasc Dis*. 2013;22:1304-11.
20. Mitchell LB, Southern DA, Galbraith D, Ghali WA, Knudtson M, Wilton SB; APPROACH investigators. Prediction of stroke or TIA in patients without atrial fibrillation using CHADS2 and CHA2DS2-VASc scores. *Heart*. 2014;100:1524-30.
21. Dong JY, Zhang YH, Qin LQ. Erectile dysfunction and risk of cardiovascular disease: meta-analysis of prospective cohort studies. *J Am Coll Cardiol*. 2011;58:1378-85.
22. Jackson G, Boon N, Eardley I, Kirby M, Dean J, Hackett G, et al. Erectile dysfunction and coronary artery disease prediction: evidence-based guidance and consensus. *Int J Clin Pract*. 2010;64:848-57.
23. Montorsi P, Ravagnani PM, Galli S, Rotatori F, Briganti A, Salonia A, et al. The artery size hypothesis: a macrovascular link between erectile dysfunction and coronary artery disease. *Am J Cardiol*. 2005;96:19M-23M.
24. Yao F, Huang Y, Zhang Y, Dong Y, Ma H, Deng C, et al. 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;35:653-9.
25. Vlachopoulos C, Aznaouridis K, Ioakeimidis N, Rokkas K, Vasiliadou C, Alexopoulos N, et al. Unfavourable endothelial and inflammatory state in erectile dysfunction patients with or without coronary artery disease. *Eur Heart J*. 2006;27:2640-8.
26. Araña Rosainz Mde J, Ojeda MO, Acosta JR, Elías-Calles LC, González NO, Herrera OT, et al. Imbalanced low-grade inflammation and endothelial activation in patients with type 2 diabetes mellitus and erectile dysfunction. *J Sex Med*. 2011;8:2017-30.
27. Lin WY, Lin CS, Lin CL, Cheng SM, Lin WS, Kao CH. Atrial fibrillation is associated with increased risk of erectile dysfunction: A nationwide population-based cohort study. *Int J Cardiol*. 2015;190:106-10.

Correspondence address:

Dilay Karabulut, MD
Department of Cardiology,
Istanbul Bakırköy Dr.Sadi Konuk Educational and
Training Hospital,
Istanbul, Turkey
Telephone: + 90 505 394-9767
E-mail: dilay_karakozak@hotmail.com