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ELUCIDATE THE CLINICAL EFFECTS OF BLOOD TESTOSTERONE CONCENTRATION ON CAVI IN WOMEN WITH DM-TYPE 2 DISEASE

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Abstract:

Background: *Data seeing testosterone as a critical danger factor of cardiovascular illness (CVD) in female patients with type 2 diabetes mellitus (DM) is restricted. Notwithstanding, some clinical examinations revealed the significance of cardio-lower leg vascular list (CAVI) as a novel physiological marker of blood vessel work in sort 2 DM. This cross-sectional investigation expected to explain the clinical impacts of blood testosterone focus on CAVI in female patients with type 2 DM.*

Methods: *An aggregate of 238 postmenopausal patients incorporating 97 with a background marked by CVD with type 2 DM (age (mean ± standard deviation (SD)), 73 ± 9 years) were enlisted. Our current research was conducted at Services Hospital, Lahore from May 2019 to April 2020. CAVI was estimated by the standard method, and serum all out testosterone fixation (T-T) was additionally estimated as a testosterone level marker in vivo. The connection among CAVI and T-T was assessed.*

Results: *CAVI is fundamentally higher (CVD versus non-CVD: 10.2 ± 1.2 versus 9.2 ± 1.0, $P < 0.001$), and log-T-T altogether lower (CVD versus non-CVD: 1.2 ± 0.2 ng/dL versus 1.5 ± 0.2 ng/dL, $P < 0.001$) in patients with CVD than those without CVD. CAVI was fundamentally adversely associated with log-T-T ($r = - 0.41$; $P < 0.001$). Besides, various relapse examination demonstrated that CVD ($\beta = 0.23$; $P < 0.001$) and log-T-T ($\beta = - 0.18$; $P < 0.01$) were chosen as free subordinate factors for CAVI.*

Conclusion: *This examination demonstrated that T-T was autonomously conversely connected with CAVI, showing that low testosterone fixation is an extensive danger factor for the movement of blood vessel brokenness in female patients with type 2 DM.*

Keywords: *Clinical Effects, Blood Testosterone Concentration, Cavi, DM-Type 2 Disease*

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INTRODUCTION:

Epidemiological and clinical studies reported the importance of type 2 diabetes mellitus (DM) as a risk factor of cardio- vascular disease (CVD) in female patients. In addition, some researchers reported that female patients with type 2 DM with a history of CVD had higher incidence of secondary CVD events than those without diabetes [1]. Therefore, CVD should be noted and prevented in female patients with type 2 DM. Testosterone is an important sex hormone that influences various health problems in men. In particular, recent clinical studies reported that low blood testosterone con- centration in men is closely associated with CVD incidence [2]. Furthermore, some researchers reported that low blood testosterone concentration is also an important CVD risk factor in male patients with type 2 DM. On the contrary, female patients also produced testosterone, but at levels approximately 5-10% of those in men. The significance of blood testosterone concentration as a CVD risk factor in female patients remains controversial. Some clinical studies have demonstrated that high blood testosterone concentration in female patients is associated with CVD incidence [3]. However, another researcher reported that low blood testosterone concentration in female patients was associated with higher incidence of CVD events than those with high blood testosterone concentration. Fur- thermoses, information regarding the clinical significance of testosterone as a CVD risk factor in female patients with type 2 DM is limited. Cardio-ankle vascular index (CAVI) is a novel physiological marker of atherosclerosis, which reflects the arterial stiffness in the aortic, femoral, and tibiae arteries [4]. This stiffness parameter has been reported to be independent of blood pressure levels during measurements. In addition, some clinical studies have indicated the importance of high CAVI as a CVD risk factor in patients with type 2 DM. To the best of the authors' knowledge, no study has assessed the relationship between testosterone concentration and CAVI in female patients with type 2 DM. Thus, this study aimed to elucidate the clinical significance of blood test Oster one concentration as a risk factor for arterial dysfunction in female patients with type 2 DM using CAVI [5].

METHODOLOGY:

Our current research was conducted at Services Hospital, Lahore from May 2019 to April 2020. The serum total testosterone concentration (T- T), CAVI, and various clinical parameters were analyzed in 238 postmenopausal patients, including 97 with CVD history with type 2 DM (age (mean ± standard deviation (SD)), 73 ± 9 years). Patients administered dehydroepiandrosterone, estradiol, and testosterone were excluded. Clinical CVD history was defined as previous ischemic heart disease, cerebrovascular disease, peripheral arterial disease, or heart failure admission based on medical records. All patients provided informed con- sent, and the study protocol was approved by the local ethics committee of the Services Hospital Medical Clinic.

CAVI measurement

CAVI was measured using the VaSera VS-1000 (Fukuda Den- shi Co. Ltd., Tokyo, Japan) based on the previously described methods [13]. Briefly, the brachial and ankle pulse waves were determined using inflatable cuffs with the pressure maintained between 30 and 50 mm Hg to ensure that the cuff pressure had a minimal effect on the systemic hemodynamics. Blood and pulse pressures were simultaneously obtained in lying supine position, after a 10-min rest in a quiet room. The CAVI in this study was the higher value obtained from the left and right extremities. CAVI was calculated using the Bramwell-Hill's equation: CAVI = a $\{(2\rho / \Delta P) \times \ln (Ps / Pd) PWV2\} + b$, where a and b are constants, ρ is blood density, ΔP is Ps - Pd, Ps is systolic blood pressure, Pd is diastolic blood pressure, and PWV is pulse wave velocity.

Statistical analysis

A commercially available statistical software program (Stat- View-J 5.0, Hulinks, Inc., Tokyo, Japan) was used for all statistical analyzes. Continuous variables were expressed as mean ± SD. Between-group comparisons were performed using the Student's *t*-test. The correlation coefficient was estimated using the Spearman's rank correlation analysis. Multivariate analysis was performed using multiple regression analysis. A P-value of < 0.05 was considered statistically significant.

RESULTS:

The distribution of T-T and CAVI in the study population is shown in Figure 1, and baseline clinical characteristics are shown in Table 1. Distribution of actual T-T of the study population was not normally distributed, even though CAVI has nearly normal distribution. Therefore, log-T-T was calculated with similar normal distribution. The mean value of log-T-T was 1.4 ± 0.3 (range, 0.9 - 2.0) ng/dL, and the mean value of CAVI was 9.6 ± 1.2 (range, 7.2 - 13.4). Comparisons of CAVI or log-T-T between patients without and with CVD are shown in Figure 2. CAVI is significantly higher and

log-T-T significantly lower in patients with CVD than those without CVD.

DISCUSSION:

In the present study, CAVI is significantly higher and log-T-T significantly lower in patients with CVD than those without CVD; furthermore, multiple regression analysis indicated that CVD was an independent variable for both CAVI and log-T-T as subordinate factors [6].

TABLE 1. Patient characteristics:

N	**238**
Age (yrs)	73 ± 9
CVD; n (%)	97 (41)
Body mass index (kg/m^2)	22.7 ± 3.6
Current smoker; n (%)	20 (8)
Hypertension; n (%)	174 (73)
Systolic BP (mm Hg)	136 ± 8
Diastolic BP (mm Hg)	82 ± 9
Dyslipidemia; n (%)	176 (74)
Total cholesterol (mg/dL)	215 ± 37
LDL cholesterol (mg/dL)	135 ± 35
Triglyceride (mg/dL)	128 ± 64
HDL cholesterol (mg/dL)	54 ± 14
FBG (mg/dL)	133 ± 24
HOMA-IR	2.5 ± 1.6
HbA1c (%)	7.3 ± 1.1
Skin AF (AU)	2.8 ± 0.6
Log- hs-CRP (mg/L)	-1.1 ± 0.5
d-ROMs test (U. Carr)	316 ± 82
Detection of E_2; n (%)	158 (66)
E_2 (pg/mL)	7.9 ± 3.4
Log-T-T (ng/dL)	1.4 ± 0.3
CAVI	
Medications	
Sulfonylurea; n (%)	157 (66)
Biguanide; n (%)	87 (37)
DPP-4 inhibitor; n (%)	114 (48)
Insulin; n (%)	34 (14)
RAS inhibitor; n (%)	124 (52)
Statin; n (%)	129 (54)

Table 2. Relationships Between CAVI, T-T and Various Clinical Parameters:

	CAVI	Log-T-T
	r	r
Age	0.38***	-0.09
CVD (Yes = 1, No = 0)	0.40***	-0.43***
Body mass index	0.03	-0.07
Current smoker (Yes = 1, No = 0)	0.05	-0.02
Hypertension (Yes = 1, No = 0)	0.15*	-0.14*
Systolic BP	0.14*	-0.13*
Diastolic BP	0.09	-0.08
Dyslipidemia (Yes = 1, No = 0)	0.06	-0.03
Total cholesterol	0.03	0.07
LDL cholesterol	0.02	0.05
Triglyceride	0.08	0.11
HDL cholesterol	-0.04	-0.07
FBG	0.09	0.1
HOMA-IR	0.12	-0.15*
HbA1c	0.14*	-0.21***
Skin AF	0.32***	-0.22***
Log- hs-CRP	0.32***	-0.25***
d-ROMs test	0.33***	-0.43***
Detection of E_2 (Yes = 1, No = 0)	-0.20**	0.47***
E_2	-0.13*	0.19**
Sulfonylurea (Yes = 1, No = 0)	0.09	0.08
Biguanide (Yes = 1, No = 0)	0.03	0.07
DPP-4 inhibitor (Yes = 1, No = 0)	-0.06	0.05
Insulin (Yes = 1, No = 0)	0.1	0.06
RAS inhibitor (Yes = 1, No = 0)	-0.07	0.03
Statin (Yes = 1, No = 0)	-0.06	0.04

This study also indicated that testosterone was inversely associated with oxidative stress levels in female patients with type 2 DM [7-8]. However, detailed mechanisms regarding the relationship between testosterone and oxidative stress in type 2 DM was not fully understood [9]. Additional basic and clinical studies were desirable to clarify the relationship between these 2 markers in type 2 DM [10].

CONCLUSIONS:

In conclusion, this study showed that T-T is independently inversely associated with CAVI, indicating that low testosterone level is a considerable risk factor for the progression of arterial dysfunction in female patients with type 2 DM.

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