PATTERN OF PERIPHERAL ARTERIAL DISEASE IN DIABETIC AND NON DIABETIC PATIENTS: ASSOCIATION AND RISKS CORRELATION

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Background and Aim:Peripheral arterial disease (PAD) is a common cardiovascular complication in patients with diabetes. The presence of PAD is a potent marker of increased cardiovascular risk.Importantly, PAD is associated with a substantial increase in the risk of fatal and non-fatal cardiovascular and cerebrovascular events, including myocardial infarction (MI) and stroke. We aimed to examine the pattern and risk association of PAD in diabetics ersu nondiabetics in Egyptians scheduled for coronary angiography.

Methods:The study included 200 patients with lower extremity arterial stenotic lesions, proved by peripheral angiography, in the cardiac catheterization laboratory of the Faculty of medicine, Zagazig University Hospital, during the period from November 2012 to January 2014. All patients were subjected to all of the following: Complete history taking, full general and local examination, ECG analysis, transthoracic echocardiography, peripheral angiography, calculation of Bollinger score for assessment of the PAD severity and the following laboratory work up: hs-CRP, HbA1C, Albumin in urine, GFR calculation, total cholesterol and total triglycerides.

Results: There was no significant difference between both groups regarding age, sex, hypertension, smoking and positive family history (p-value >0.05), There was no significant difference between both groups regarding LVEDD, LVESD and EF (p-value >0.05), There was significant difference between both groups regarding *hs*-CRP, HbA1c, GFR, Albuminuria, Total cholesterol and Triglycerides (p-value <0.05), being higher in group (1), There was no significant difference between both groups regarding mean Bollinger score of the aorta, common iliac, external iliac, internal iliac, superficial femoral and profundafemoris arteries while there was highly significant difference between both groups regarding mean total Bollinger score, mean Bollinger score of popliteal, anterior tibial, peroneal artery and posterioirtibial arteries (below the knee arteries); being higher in group (1).There was significant positive correlation between total Bollinger score and hs-CRP, total Cholesterol and triglycerides in both groups, ($p<0.05$), while in group (1) there was significant positive correlation between total Bollinger score and each of HbA1C and Albuminuria ($p<0.05$), and significant negative correlation between total Bollinger score and GFR ($p<0.05$).

Conclusions: The current study showed that peripheral arterial disease differs in diabetic patients compared to non-diabetics in severity (being more severe in diabetics), distribution (tends to more distal affection among diabetic patients), associated risk factors and predictors of severity (as in diabetics it depends more on HbA1C, GFR, dyslipidemia, hs-CRP and albuminuria while in non-diabetic patients it depends only on hs-CRP and dyslipidemia)

Key Words: PAD (Peripheral artery disease), Diabetes Mellites, Bollinger score.

INTRODUCTION

Peripheral artery disease (PAD) is associated with an increased risk of cardiovascular events and mortality (1, 2).Morbidities resulting from PAD, including functional decline, intermittent claudication, critical leg ischemia, and amputation, severely affect quality of life (3). It is well known that diabetes mellitus (DM) is a metabolic disorder characterized by increased mortality rates and importantly implicated in the atherogenetic process(4). Hyperglycemia, insulin resistance, hyperinsulinemia, hyperlipidemia, and hyperhomocysteinemia represent important pathophysiological components of DM that result in endothelial/ vascular dysfunction through several underlying processes (5).Patients with diabetes mellitus often have extensive and severe PAD and a greater propensity for arterial calcification (6).

MATERIALS AND METHODS

The study included 200 patients with lower extremity arterial stenotic lesions, proved by peripheral angiography, in the cardiac catheterization laboratory of the Faculty of medicine, Zagazig University Hospital, during the period from November 2012 to January 2014.The following patients were excluded from our study: Patients who underwent a vascular surgical procedure of the aorto-iliacand/or the lower limb vessels, patients with history of previous endovascular intervention, patients with normal peripheral angiography, patients with cellulitis in lower limbs and patients with deep vein thrombosis. We divided the patients into 2 groups according to the presence or absence of diabetes mellitus; group (1) which included 100 diabetic patients, group (2) which included 100 non-diabetic patients. All patients were subjected to all of the following: Complete history taking, full general and local examination, ECG analysis, ankle brachial pressure index, transthoracic echocardiography, peripheral angiography, calculation of Bollinger score for assessment of the PAD severity and the following laboratory work up: hs-CRP, HbA1C, Albumin in urine, GFR calculation, total cholesterol and total triglycerides.

STATISTICAL ANALYSIS

Statistical analyses were performed using the SPSS 21.0 software package(SPSS, Inc.,

Chicago,Illinois). Continuous (Scale)data are presented as Mean ±Standard Error (SE). Differencesin group means were assessed using independentStudent's t test and likelihood ratio chi-square testas appropriate.Pearson correlation analysis (r = correlation coefficient)was utilized to determine unadjusted bivariate correlationbetween two variables (BMI, Age and DukeScore were scale variables in this study). A 2-tailed p value of <0.05was considered statistically significant for all analysis.

RESULTS

There was no significant difference between both groups regarding age, sex, hypertension, smoking and positive family history (p-value >0.05), There was no significant difference between both groups regarding LVEDD, LVESD and EF (p-value >0.05), There was significant difference between both groups regarding hs-CRP, HbA1c, GFR, Albuminuria, Total cholesterol and Triglycerides (p-value <0.05), being higher in group (1), There was no significant difference between both groups regarding mean Bollinger score of the aorta, common iliac, external iliac, internal iliac, superficial femoral and profunda femoris arteries while there was highly significant difference between both groups regarding mean total Bollinger score, mean Bollinger score of popliteal, anterior tibial, peroneal artery and posterioir tibial arteries (below the knee arteries); being higher in group (1) [Diabetic patients]. There was a strong positive correlation of high statistical significance between Bollinger score and hs-CRP in diabetic patients (p-value =0.001), There was a very strong positive correlation of high statistical significance between Bollinger score and hs-CRP in non-diabetic patients (p-value <0.001), There was a strong positive correlation of high statistical significance between Bollinger score and HbA1C in diabetic patients (p-value <0.001) while, there was a non-significant positive correlation between Bollinger score and HbA1C in non-diabetic patients (p-value >0.05), There was a significant negative correlation between Bollinger score and GFR in diabetic patients (p-value <0.05), There was a non-significant weak positive correlation between Bollinger score and GFR in non-diabetic patients (p-value >0.05), There was a strong positive correlation of statistical significance between Bollinger score and Albuminuria in diabetic patients (p-value =0.001), There was a non-significant weak negative correlation between Bollinger score and Albuminuria in non-diabetic patients (p-value >0.05), There was a positive correlation of statistical significance between Bollinger score and Total cholesterol in diabetic patients (p-value =0.001), There was a positive correlation of statistical significance between Bollinger score and Total cholesterolin non-diabetic patients (p-value <0.05), There was a positive correlation of statistical significance between Bollinger score and Triglyceridesin diabetic patients (p-value <0.05) and finally, there was a positive correlation of statistical significance between Bollinger score and Triglyceridesin non-diabetic patients (p-value <0.001).

Table (1): Shows demographic data and risk factors in the study groups:

Variable		Group (1) (n=100)		*Group (2) (n=100)*		*P-Value*
		X ±SD		X ±SD		
Age		59.17±10.5		57.4±9.4		0.146
		N	**%**	**N**	**%**	
Gender	**Female**	49	49%	41	41%	0.256
	Male	51	51%	59	59%	
HTN		54	54%	45	45%	0.203
Smokers		26	26%	27	27%	0.873
Family history		9	9%	10	10%	0.809

X= mean, SD= Standard deviation.

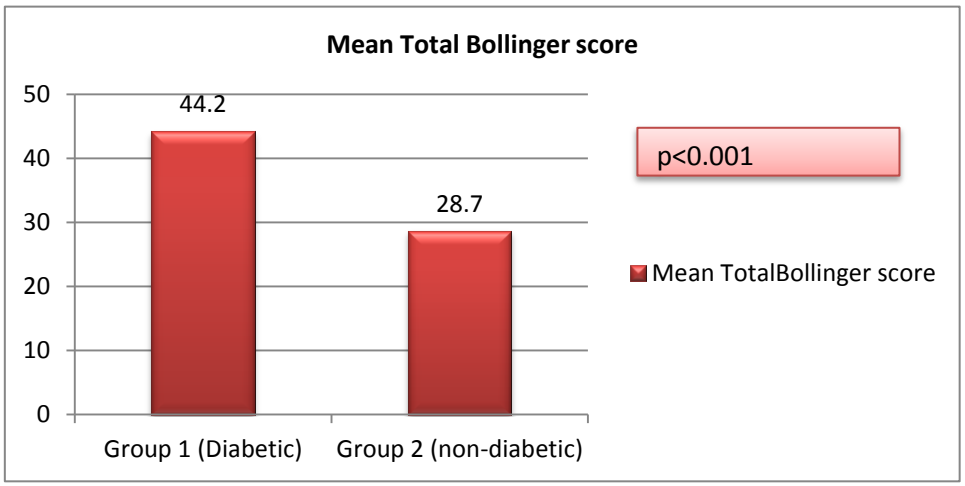

Figure (1): Shows mean total Bollinger score in the study groups

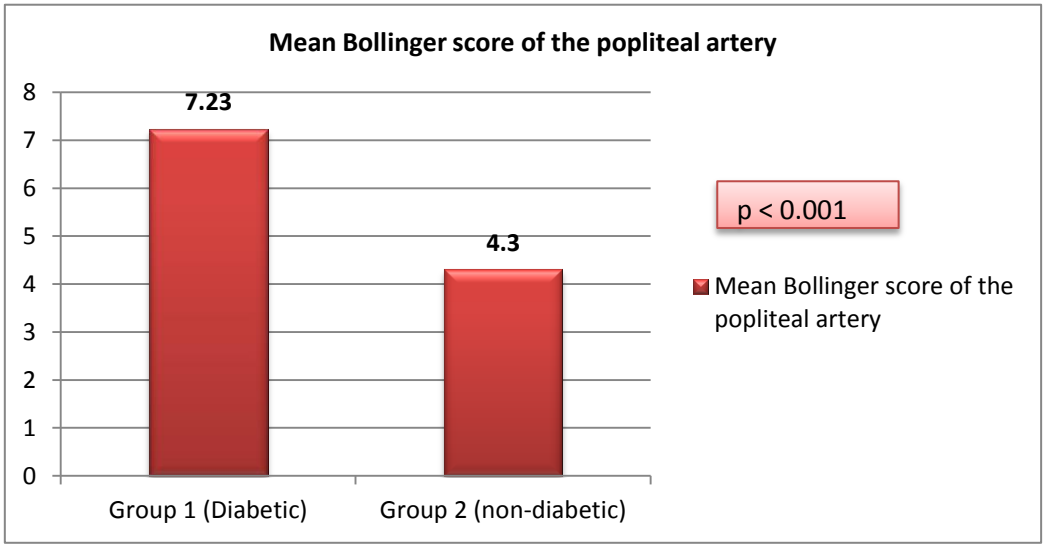

Figure ( ): mean Bollinger score of the popliteal artery in the study groups.

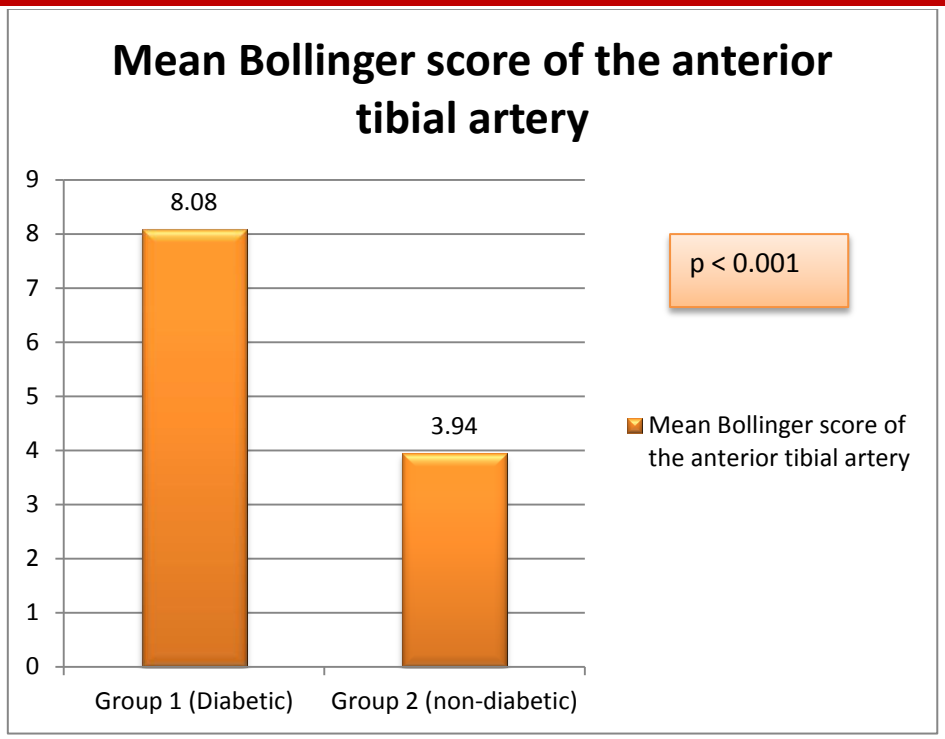

Figure (3): Shows mean Bollinger score of the anterior tibial artery in the study groups.

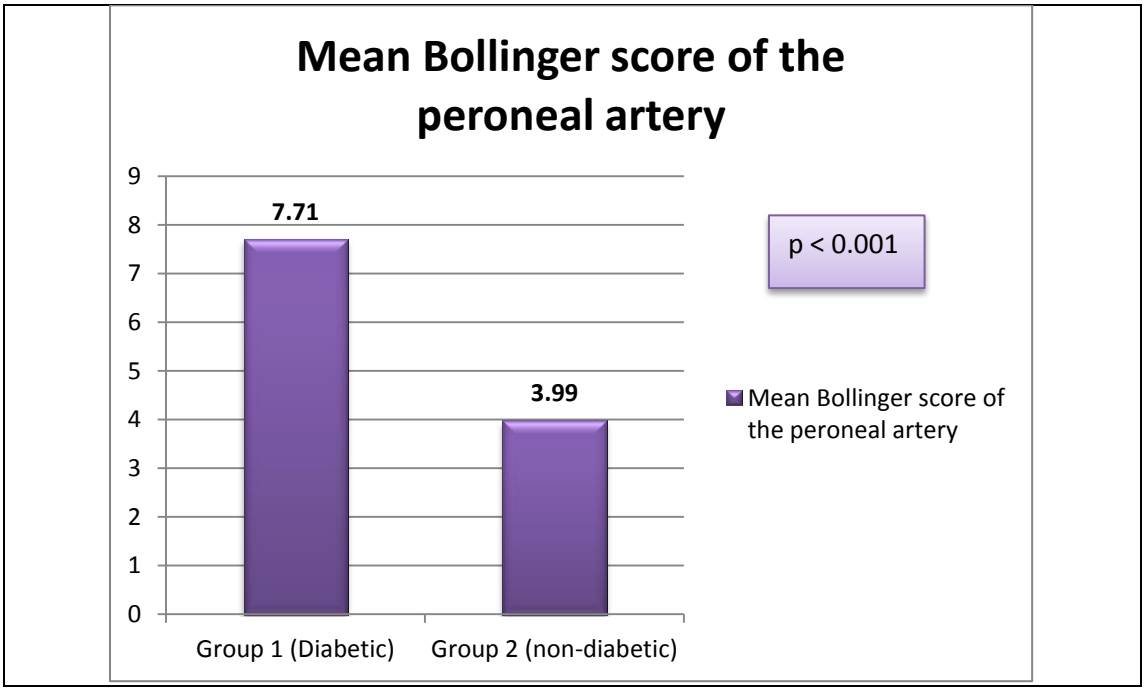

Fig. (4): Shows mean Bollinger score of the peroneal artery in the study groups.

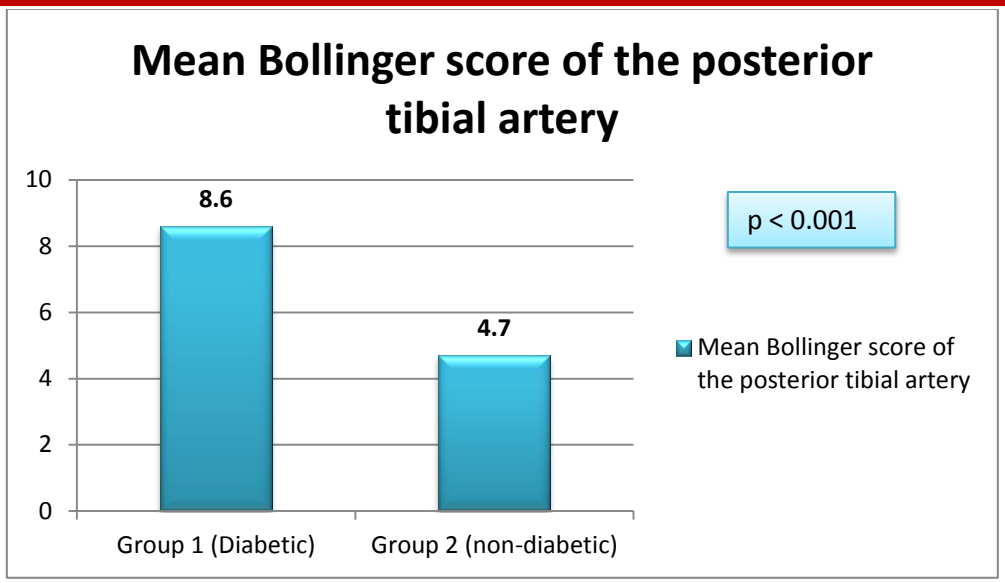

Figure (5): Shows mean Bollinger score of the peroneal artery in the study groups.

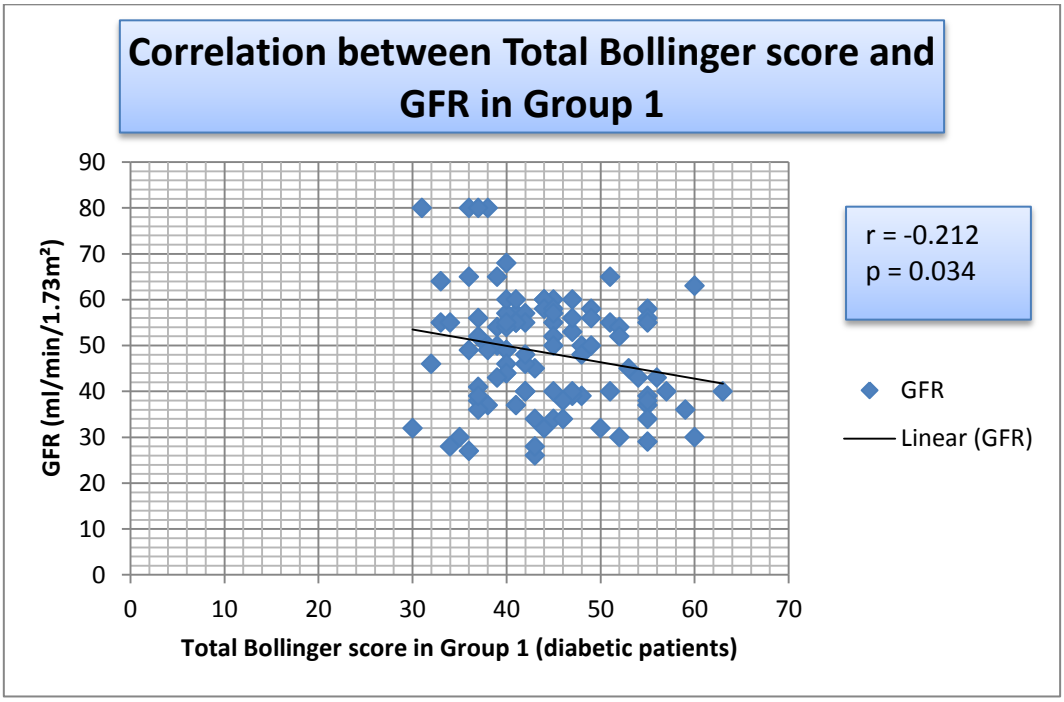

Figure (6): Shows Correlation between Total Bollinger score and GFR in Group 1

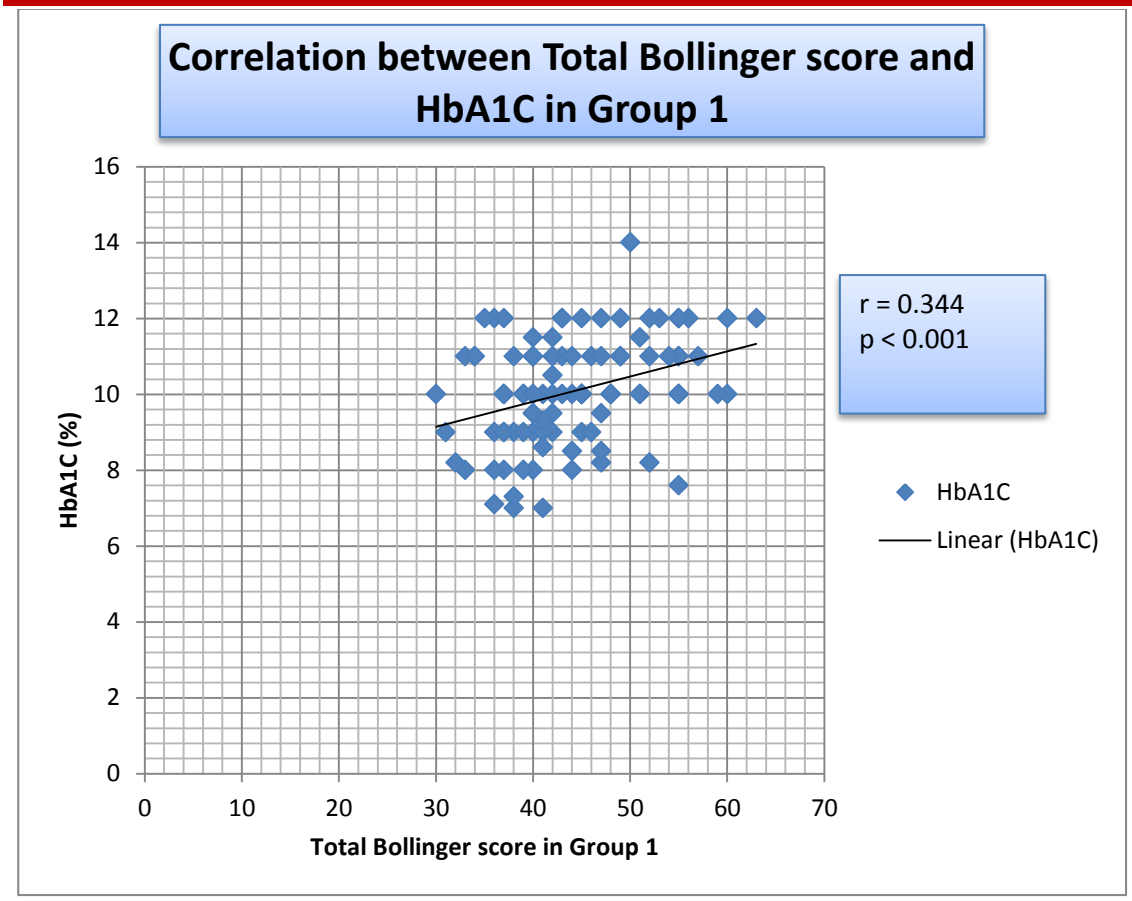

Figure (6): Shows Correlation between Total Bollinger score and HbA1C in Group 1

DISCUSSION

In the present study, we evaluated the pattern, severity and associated risk factors of peripheral artery disease in diabetic versus non diabetic patients and we tried to test the correlation of different risk factors with the severity of peripheral artery disease using Bollinger score. The main findings of our study include: diabetic patients had more severe PAD than non-diabetic patients; total Bollinger score being higher among diabetic patients -This was consistent with the findings of Jude et al. (7)

- In our study we have found that that there was difference between diabetic and non-diabetic patients regarding the distribution of arterial tree affection in the lower limbs; diabetic patients had more severe arterial affection in the below knee arteries (popliteal, anterior tibial, peroneal, posterior tibial) than non-diabetic patients with high statistical significance, ($p < 0.001$).This was consistent with the aforementioned study conducted by Jude et al (7), who found that diabetic patients had greater severity of arterial disease in the all arterial segments below the knee

The current study showed a significant difference between both groups regarding HbA1C; with a significant positive correlation between Bollinger score and HbA1C in group (1), while in group (2) the correlation was not significant. This was consistent with a study conducted by Al-Delaimy et al. (8).

In the present study we found that there was significant difference between both groups regarding hs-CRP being higher in group (1), and in both groups there was significant positive correlation between hs-CRP and Bollinger score. This was consistent with a study conducted by Vainas et al. (9)

There was a significant difference between both groups regarding Albuminuria, being higher in group (1). with a significant positive correlation between Albuminuria and Bollinger score in group (1), while this finding was not present in group (2) as the correlation was of no statistical significance. The same conclusion was demonstrated in a study conducted in Pakistan by Ahmadani et al. (10)

We demonstrated that there was a significant difference between the study groups regarding glomerular filtration rate being lower in group (1). There was also significant negative correlation between Bollinger score and GFR, while no

significant correlation was found between Bollinger score and GFR in group (2). This was consistent with a study conducted by Sheen et al, (11)

In our study there was significant difference between the groups regarding total cholesterol and triglycerides being higher among group (1). Moreover, there was significant positive correlation between Bollinger score and each of total cholesterol and triglycerides in both study groups. The same results were observe in a study conducted by Liang et al. (12)

Limitations:

Limitations of our study were: Relatively small sample size, inability to perform laboratory tests for the recent biomarker for PAD eg Markers of endothelial dysfunction; soluble cell adhesion molecules and Modulators of angiogenesis: soluble Tie 2, VEGF; hepatocyte growth factor.

CONCLUSION

We concluded that peripheral arterial disease differs among diabetic patients than non-diabetic patients in the following: Severity; being more severe in diabetics, Distribution; tends to more distal affection among diabetic patients, associated risk factors and predictors of severity; as in diabetics it depends more on HbA1C, GFR, dyslipidemia, hs-CRP and albuminuria while in non-diabetic patients it depends only on hs-CRP and dyslipidemia.

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