# Role of color Doppler ultrasonography Vs computed tomography angiography in evaluation of diabetic foot

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**Abstract: Background:** Diabetic foot infections are among the most serious and frequent complications in patients with diabetes mellitus. **Aim of the Work:** The aim of our study is to highlight the role of multidetector computed tomography Angiography (MDCTA) and Color Doppler ultrasonography for evaluation of patient with diabetic foot. **Patients and Methods:** Our study was performed on thirty type II diabetes patients with uncontrolled hyperglycemia. clinical presentation including rest pain in six (20%) patients, intermittent claudication pain in nine (30% ) patients, minor tissue loss "ulceration" in six (20%) patients, major tissue loss in twelve (40%) patients. All patients subjected to computed tomography Angiography (CTA) and Color Doppler ultrasonography. **Results**: In this study the number of segments were 399 for 57 limbs, each arterial tree of one limb was divided into 7 segments (common femoral, superficial femoral, popliteal, anterior tibial, posterior tibial, peroneal and dorsalis pedis arteries). In assessment of the agreement between Doppler and CTA regarding detection of patency, stenosis, occlusion and occlusion with collaterals refilling reveal that: the number of stenotic segments was 38 (9.5%) and 42 (10.5 %) on MDCTA & DUS respectively, the number of occluded segments with distal collaterals refilling was 16 (4 %) and 16 (4 %) on MDCTA & DUS, respectively, while the number of segments with a total occlusion was 65 (16.2%) and 63 (15.7%). on MDCTA & DUS, respectively. **Conclusion:** Imaging of the diabetic foot entails a variety of imaging modalities. The usage of CTA increases the ability for better delineation of vascular anatomy, it can visualize the arterial tree, localize the obstruction, assess the severity stenosis, detect the presence of collaterals and distal run off which helps in planning for management of peripheral arterial disease.

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**Key words:** Computed Tomography Angiography, Color Doppler Utrasonography, Diabetes Mellitus.

## 1. Introduction

Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia and dyslipidemia. The abnormalities in nutrient metabolism and vascularity resulting from DM lead to infection, foot ulcers and impairment of wound healing. Diabetic lower limb ischemia often leads to limb necrosis. Lower extremity bypass surgery (LEBS) is indicated to prevent limb loss in patients critical leg ischemia (1). The risk for ulceration and amputation is much higher in diabetics than non-diabetics. The lifetime risk of diabetic individual to develop an ulcer is as high as 25%. Peripheral neuropathy, arterial disease and foot deformities are the main factors accounting for this increased risk. Age and sex as well as social and cultural status are contributing factors (2). Delayed wound healing in diabetic patients without large vessels disease has been attributed to micro-vascular dysfunction and abnormal cellular and inflammatory responses (3). Computed Tomography Angiography (CTA) is beginning to be used more frequently to assess peripheral vascular disease of diabetic foot as it is less invasive than DSA and can provide 3D images. MDCT is a recent technological advance in CTA that can decrease acquisition time and increase spatial resolution. MDCT can produce high spatial resolution images of the entire extremity in several seconds (4). Color Doppler Ultrasound is a widely available non-invasive, cheap and accurate diagnostic technique. In most cases of diabetic foot color duplex examination results in accurate diagnosis of the status of underlying arterial tree and consequent decision making either conservative, interventional or surgical (5).

## 2. Patients and Methods

The current study included 30 diabetic patients presented with diabetic foot vascular lesions and referred to Radiology department, Bab Al Sharia University Hospital and Private center. The current study was done at the period from December 2017 to December 2018. The age range as 47- 86 years old, 22 of whom were men and 8 women. Inclusion criteria include Diabetic patients, Symptoms of ischemia (intermittent claudication, rest pain), Patients with ischemic ulcers and gangrene, Patients with foot cellulites and Past history of any vascular surgical

intervention of the lower limb (previous debridement, drainage, amputations). Exclusion criteria include chronic renal failure, Lactic acidosis and History of trauma.

**All patients was subjected to the following:**

History taking Personal history: name, age, sex and occupation. History of the present condition: onset, duration before presentation, history of trauma (type and mechanism). Past history of diabetes mellitus (onset, duration, control, treatment), hypertension, heart disease (ischemic, rheumatic) or renal disease. Symptoms of ischemia (intermittent claudication, rest pain). Past history of any vascular surgical intervention of the lower limb. Clinical examination including general examination with special emphasis on lower limbs vascularity as regard: pulse, vascular refilling. Routine laboratory investigation: blood urea, serum creatinine, and fasting blood glucose level.

**Doppler ultrasonography:**

The examination were done mainly by GE S6 expert ultrasound machines Using combined grey scale & color flow duplex and Doppler spectral mode by superficial probe (7.5 MHz) to scan the arterial tree to starting from the common femoral to dorsalis pedis artery: the femoral arteries are examined with the patient supine while the thigh is abducted, externally rotated & flexed. The common femoral artery is examined in longitudinal & transverse planes down to its bifurcation. Then the deep femoral & superficial femoral arteries are examined in similar way down to the adductor hiatus. Then the patient is asked to lie in the prone position to examine the popliteal artery proximal & distal segments and followed down to its bifurcation into the tibio-peroneal trunk and anterior tibial artery. The posterior tibial artery is located by Placing the transducer in a longitudinal position in the medial aspect of the mid-calf area behind the tibia. The peroneal artery is examined from two approachs: Firstly from a posteromedial approach similar to that used for posterior tibial artery and from the anterolateral approach used for the anterior tibial artery. The anterior tibia artery is examined from an anterolateral approach. Biplanar (longitudinal and transverse) scanning reassured identification of luminal defects and occlusion that could potentially be missed by uniplanar imaging. All areas of suspected abnormalities were assessed by direct diameter reduction measurement on color and/or power image as well as spectral analyses, including PSV and PSV ratios. Residual stenosis due to plaque creating more than 50% luminal diameter reduction and PSV ratio step –up ≥2 were considered significant.

**Multi-detector Computed Tomography Angiography:**

At first we explain the examination to the patient total immobilization of the patient during the examination is of vital importance and anesthesia may be required as in claustrophobic patients.

**Scan parameters:**

The examinations were done mainly on TOSHIBA Activion 16 MDCT, the slice thickness: 1.5mm. For the display of soft tissues, a window level of 40 HU and a window width between 400 and 700 HU were selected; these provide enough contrast between fat and air. A window level between 40 and 300 HU and a window width between 2400 and 3200 HU were selected for imaging of bony structures. Patients were placed in the supine position, Scanning started at the abdomen and proceeded craniocaudaly. total of 100 -120 ML of nonionic contrast material (Iopromide300) was administered at a rate of 3-4 ML/s by using power injector and a 20-gauge intravenous catheter inserted into an antecubital vein followed by 20 ml normal saline injection. A single low-dose CT image is obtained, without contrast administration, at the level of the celiac axis. A10–15 $mm^2$ circular region of interest is placed inside the middle of the aortic lumen and this will subsequently measure the Hounsfield units of the aortic lumen on subsequent scanning. At 10 seconds following IV contrast administration, serial low-dose monitoring CT scans are obtained at the same table position (celiac axis level) at 2-second intervals. When the region of interest detects a preset contrast enhancement level (usually a 100 –150 HU value), there is automatic triggering of the scanner to acquire images in the desired scan range, from the level of the celiac axis to the feet. This time-efficient method ensures optimal arterial enhancement within the region of interest. Because the possibility of even more delayed arterial opacification than accounted for in the scan protocol cannot be excluded, a second CT angiography acquisition (covering the popliteal and infrapopliteal vasculature) should be preprogrammed into the scanning protocol. This acquisition is initiated by the CT technologist immediately after the main CT angiography acquisition only if no contrast medium opacificaton seen in the distal vessels. Image reconstruction and manipulation were performed on a workstation. Many post-processing techniques, such as MPR, MIP and VRT were done in most of the cases. However, inspection of the axial source images remains an essential part of the assessment.

## 3. Results

**Demographic Data:**

The current study included thirty diabetic patients referred to Radiology department, Bab Al Sharia University Hospital and Private center. Among our thirty patients we had twenty two (73.3%) males

and eight (26.7%) females. Clinical presentation was as follows: claudication in nine (30.0%) cases, rest pain in six (20.0%) cases, redness and edema in thirty (100.0%) cases, minor tissue loss in six (20.0%) cases and major tissue loss in twelve (40.0%) cases. Sixteen patients (53.3% ) had bilateral complaint and fourteen (46.7%) had unilateral affection. Among our patients, smoking or history of smoking was present in nineteen out of 30 patients. Hypertension was present in twenty five out of thirty patients. Hyperlipidemia was present in twenty five out of thirty patients. Coronary artery disease was present in ten out of thirty patients.

The study assessed the agreement between CTA findings and Doppler ultrasound findings regarding arteries of lower limbs on both sides. The studied arterial segments were classified into normal, stenotic, occluded, and occluded with collaterals formation. Degrees of kappa agreement classified to very good agreement (0.81-1.00), good agreement (0.61-0.80), moderate agreement (0.41 -0.60), fair agreement (0.21-0.40), poor agreement (0.0-0.20), and no agreement <0.

In this study the number of stenotic segments was 38 ( 9.5%) and 42 (10.5 %) on MDCTA & DUS respectively. The number of occluded segments with distal collaterals refilling was 16 (4 %) and 16 (4 %) on MDCTA & DUS, respectively. The number of segments with a total occlusion was 65 (16.2%) and 63 (15.7%). on MDCTA & DUS, respectively.

**Table1: Patients'Demographic**

| Variable | Mean ± SD / Number (%) |
|---|---|
| Age (years) | 59 ± 11 |
| Gender | |
| F | 8 (26.7%) |
| M | 22 (73.3%) |
| Smoking | 19 (63.3%) |
| Associated diseased | |
| Hypertension | 25 (83.3%) |
| CAD | 10 (33.3%) |
| Relevant past history | |
| History of foot problems | 6 (20.0%) |
| Above knee amputation | 3 (10.0%) |
| Clinical presentation | |
| Rest pain | 6 (20.0%) |
| Intermittent claudication | 9 (30.0%) |
| Redness and edema | 30 (100.0%) |
| Minor tissue loss | 6 (20.0%) |
| Major tissue loss | 12 (40.0%) |
| Laterality of PAD | |
| Unilateral | 14 (46.7%) |
| Bilateral | 16 (53.3%) |
| Biochemical work-up | |
| FBS (mg/dl) | 262 ± 70 |
| BUN (mg/dl) | 35 ± 9 |
| Serum creatinine (mg/dl) | 1.1 ± 0.2 |
| INR | 1.02 ± 0.11 |

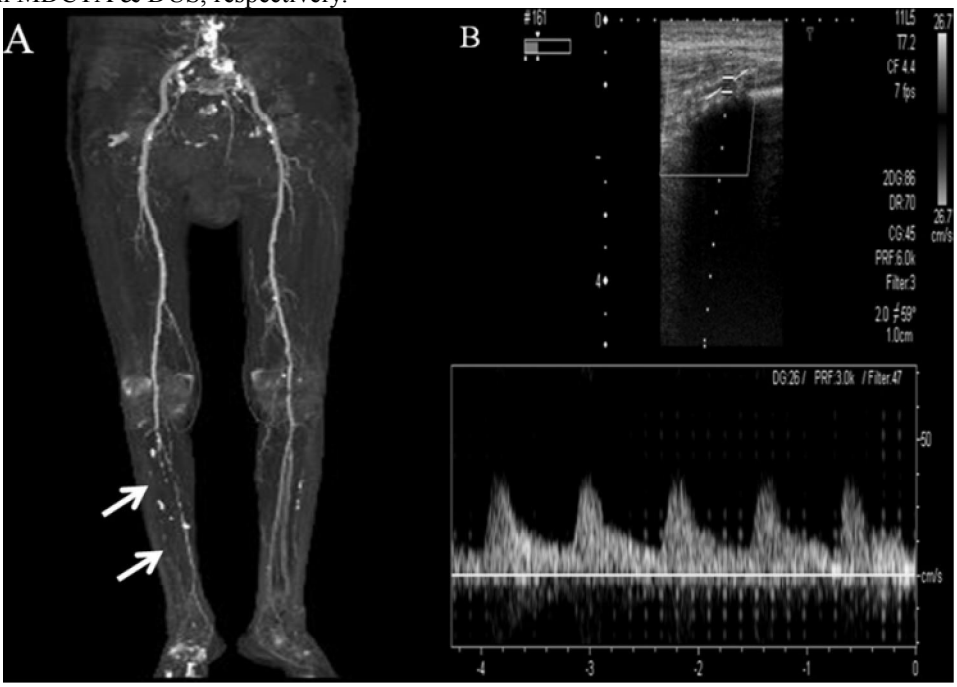


**Fig. 1:** Sixty-eight-year old man with intermittent claudication and pain in right leg. (A) MDCTA image (maximum-intensity-projection reconstruction) shows long segment stenosis (>50%) in the anterior tibial artery. (B) Corresponding DUS spectrum demonstrates low velocity monophasic flow pattern consistent with high grade stenosis.

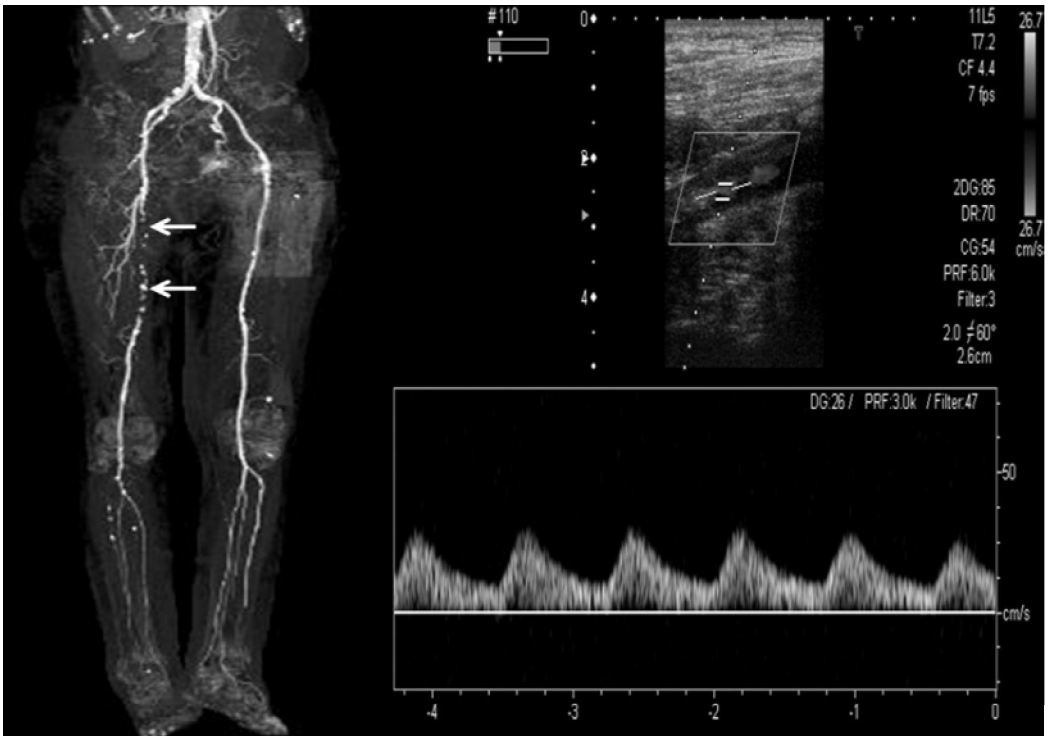


**Fig. 2:** Fifty-five-year old woman with intermittent claudication in right leg. (A) MDCTA image (maximum-intensity-projection reconstruction) shows long segment stenosis (>50%) in superficial femoral artery. (B) Corresponding DUS spectrum demonstrates low velocity monophasic flow pattern consistent with high grade stenosis.

**4. Discussion**

Diabetic foot infection is simply defined as any infra-malleolar infection in diabetic patients. This includes paronychia, cellulitis, abscesses, necrotizing fasciitis, septic arthritis, tendonitis, and osteomyelitis. The most common and classical lesion, however, is diabetic foot ulcer "DFU". The purpose of the current study focused on the assessment of the role of MDCT angiography and color Doppler ultrasonography in diagnosis of diabetic foot infections which are among the most serious and frequent complications encountered in patients with diabetes mellitus. This study included thirty patients had diabetic foot infection. Twenty two of the patients were males represent 73.3% and eight were females represent 26.7%. Their ages are mainly between 42-86 years with a mean age of 59 ± 11 years. This supported by **(6) Adam; et al., (2011)** which reported that the occurrence of DFUs mostly in males and middle aged patients. In the present study (100%) of the patients were type II diabetes mellitus and had uncontrolled hyperglycemia with mean level 262 ± 70 mg/dl. This supported by (7) **Shailesh; et al., (2012)** in a study of prevalence of diabetic foot ulcer and associated risk factors in diabetic patients, he found that uncontrolled glucose level delays wound healing and results in severity of ulcers and appearance of grade III and IV ulcers. (8) **Andrade; et al., (2004)** stated that; The duration of diabetes was positively correlated with the prevalence of PAD in most studies screening for PAD. Once PAD develops in association with diabetes the long-term prognosis was poor and carried a high mortality rate mainly because of cardiovascular and cerebrovascular diseases. In the present study, the duration of diabetes since first time of diagnosis ranged from 4 months (accidentally discovered on admission with previous toe gangrene) to 18 years duration with a mean of (10.13 ± 7.27) years. While the median diabetes duration in the studied patients reached 9.50 years. In the present study smoking or history of smoking was present in 19 out of 30 patients. Hypertension was present in 25 out of 30 patients. Hyperlipidemia was present in 25 out of 30 patients. This is supported by (9) **Smith; et al., (2004)** who stated that traditional major risk factors for development of PAD include advanced age, cigarette smoking, diabetes mellitus, dyslipidemia, and hypertension. Among these, cigarette smoking and diabetes mellitus are the modifiable risk factors that place patients at the greatest risk for PAD.

The reported clinical presentation in the thirty patients includes rest pain in six patients, intermittent

claudication pain in nine patients, minor tissue loss "ulceration" in six patients, major tissue loss in twelve patients. The clinical effects vary with the site and the degree of vascular insufficiency. This is in accordance with the findings of the other studies which showed that the most common symptoms of PAD is intermittent claudication (IC). More extreme presentations of PAD include: rest pain, tissue loss, or gangrene; these limb-threatening manifestations of PAD are collectively termed critical limb ischemia (CLI). Among PAD patients without classic symptoms of IC, some are asymptomatic, other than IC (atypical leg pain) (10) **(McDermott; et al.,**2001). So much disease is asymptomatic perhaps because they have severely limited their walking activity to avoid exertional leg symptoms. Also collateral circulation may prevent symptoms in other. All these factors make screening for PAD in symptomatic individuals only an unreliable method especially in diabetics who, in addition to the pre-mentioned factors, suffer from neuropathy with blunted pain perception (11) **(Marinelli; et al.,1999).**

In this study, six of the patients had previous leg ulceration. They were on the same side of the affected limb, four progressed to toe gangrene and the other two progressed to ulceration of the dorsal aspect of the foot. Three patients had previous major amputation (above knee amputation). These findings were consistent with the report of (12) **Armstrong and Wu (2005)** who reported that previous ulceration and amputation have been recognized as risk factors for subsequent diabetic limb ulceration. It is presumed that patients with history of ulceration possess all the risk factors necessary to produce another ulceration. It has been reported that between 20-58% of patients develop another ulcer within a year after healing a wound.

The aim of the present study was to illustrate the role of CTA as a non- invasive method in assessment of vasculature in patients with diabetic foot infection. **(13) Albrecht; et al., (2007)** stated that; The advantages of CTA over conventional digital subtraction angiography (DSA) include minimal invasiveness, lower complication rate, 3D volumetric data analysis and display, visualization of mural plaque and calcium, and shorter examination times.

**(14) Kayhana; et al.,2012** stated that: MDCT angiography (MDCTA) has been shown to be a reliable non -invasive tool in quantifying length, number, and grade of stenosis in peripheral arterial occlusive disease (PAOD) patients. It has also been shown to be an accurate diagnostic test in patients with stenosis more than 50%, and it has even been stated to replace DSA in selected cases.

**(15) Fleischmann; et al., (2005)** stated that, the principle goal of CTA is to evaluate the extent of disease and characterize vessel morphology as to distinguish lesions by type (i.e., atheromatus versus thromboembolic); occlusion; length (i.e. focal, short segment, long segment); vascular territory distribution. That CTA can offer a way to address treatment planning. For patients with lesions amenable to intervention, CTA also provides a road map, in particular target vessels for potential distal surgical anastomosis.

Many display formats were used in this study, including maximum intensity projection (MIP), volume rendering (VR), multiplanar reconstruction (MPR), and curved planar reformatting (CPR) techniques. Each display technique has strengths and weaknesses. **(16) Nakayama; et al., (2002)** stated that maximum intensity projection (MIP) and volume rendering technique VRT were used. MIP can create a vascular map for display to a referring physician. MIP is also well suited for the rapid demonstration of collateral vessels, since demonstration of the 3D relationships is not imperative. Unlike MIP, volume rendering does not absolutely require slab editing, since the bones do not necessarily interfere with visualization of the vasculature. This is useful in anatomic regions where bones and vessels are in close proximity.

In the present study the number of segments were 399 for 57 limbs, each arterial tree of one limb was divided into 7 segments ( common femoral, superficial femoral, popliteal, anterior tibial, posterior tibial, peroneal and dorsalis pedis arteries ). In the present study the number of segments with a stenosis were 38 (9.5 %) out of 399 on MDCTA. The number of segments was diagnosed as occluded with distal collaterals refilling were 16 (4%) out of 399 on MDCTA. The number of segments with a total occlusion were 65 (16.2 %) out of 399 on MDCTA.

In the present study the number of segments was diagnosed as occluded with distal collaterals refilling were 16 (4%) out of 399 on MDCTA, so visualization of collaterals was easy using MIP images, which appeared at site of severe stenosis or occluded arteries leading to refilling off to the arteries distal to the occluded segment. Collaterals are indicative of chronic arterial disease.

**(17) Ouwendijk; et al.,. (2005)** found significant change in diagnostic accuracy and interobserver agreement in arterial segments with calcifications than in segments without calcifications and that, in these cases, patients could not be treated without undergoing DSA for accurate evaluation.

**(18) Ota; et al., (2004)** evaluated the effect of mural calcifications on the diagnostic performance of MDCT angiography, they stated that there is a significant negative effect in specificity and accuracy of MDCT.

**(19) Martin; et al.,2003** stated that sensitivity and specificity are greater for arterial occlusions than for the detection of stenosis. Accuracy and interobserver agreement are also greater for femoro-popliteal and iliac vessels compared with infra-popliteal arteries. Foot arteries have not been specifically analyzed in any published series. The presence of vessel calcifications reduces diagnostic performance of multiple–detector row CT in general.

In the present study twenty five cases out of thirty had arterial wall calcification ranging from mild arterial calcification ( twenty cases ) to severe arterial wall calcification (five cases ).

In the current study patients with heavy calcification and stent, MIP cannot provide good interpretation. For accurate interpretation we needed a careful comparison of the MIP images with the axial source images to provide the sufficient data.

**(20) Mesurolle; et al.,2004** stated that The diagnostic performance of MDCTA in subdivision of the lower extremities has been tasted, and studies reported that a lower sensitivity and specificity for infra popliteal tract than for the aorto iliac and the femoro popliteal tracts, although these differences were not statically significant.

**(21) Ofer; et al., (2003)** stated that producing accurate MIP images of the ATA on its distal course on the lateral surface of the tibia (after bone removal), was impossible with current automatic and semi-automatic segmentation software. They found that this could only be accomplished by manual drawing of both arteries over at least 80 axial slices. This proved to be time consuming and questionable value.

In the present study evaluation of this particular segment was done through axial slices, axial images were also used for detailed analysis in all cases. As in three cases in which apparent occlusion of lower segment of ATA was noticed on MIP image. This segment was seen patent on axial image.

In this study, all cases underwent Doppler examination as a rapid, non- invasive complementary diagnostic tool and compared the findings with CTA.

**(22) Sidhu an Allan, 2006** stated that Doppler examination is relatively inexpensive and non-invasive and use non ionizing radiation or contrast material.

**(23) Lingegowda; et al.,2012** in studying imaging modality in diabetic ischemic foot stated that when the diabetic patient presented with a non-healing ulcer, the investigation of choice should be duplex ultrasound. Ultrasound not only safe and non-invasive, it also serves to guide further patient management. Since ultrasound has high negative predictive value, no further investigation is required when duplex findings are normal.

**(14) Kayhana; et al., (2012)** in a study to evaluate the role of Multidetector CT angiography versus arterial duplex DUS in diagnosis of mild lower extremity peripheral arterial disease stated that Duplex ultrasonography (DUS) has been used as the initial imaging modality in mild symptomatic PAD. Despite its wide use in patients with PAD, DUS has a lower sensitivity than MRA and CT angiography. It does not directly provide a roadmap' of the vascular system and it is technically difficult to assess the aortoiliac vessels due to interference by bowel gas and the depth of the vessels; this has caused a debate over performing it as the sole diagnostic imaging technique before proceeding to surgery. This has enabled (MDCT) to become a promising modality in lower extremity arterial imaging.

In the present study Doppler ultrasound was done to all patients with diabetic foot infection, which helped in primary mapping of the vessels which was not accurate as MDCT due to some disadvantages as the patients status, presence of calcification, and deeply seated peroneal artery.

The study assessed the agreement between CTA findings and Doppler ultrasound findings regarding arteries of lower limbs on both sides. The studied arterial segments were classified into normal, stenotic, occluded, and occluded with collaterals formation. Degrees of kappa agreement classified to very good agreement (0.81-1.00), good agreement (0.61-0.80), moderate agreement (0.41 -0.60), fair agreement (0.21-0.40), poor agreement (0.0-0.20), and no agreement <0.

In this study the number of stenotic segments was 38 ( 9.5%) and 42 (10.5 %) on MDCTA & DUS respectively. The number of occluded segments with distal collaterals refilling was 16 (4 %) and 16 (4 %) on MDCTA & DUS, respectively. The number of segments with a total occlusion was 65 (16.2%) and 63 (15.7%). on MDCTA & DUS, respectively.

**(14) Kayhana; et al.,2012** in their study of 43 patients by both Doppler and MDCTA The number of segments with a stenosis greater than 50% stenosis was 27(3.49%) and 35 (4.52%). on DUS and MDCTA, respectively. The number of segments with occlusion was 59 (7.62%) and 95 (12.27%) on DUS and MDCTA respectively. Over all the analysis of this result showed that when DUS and MDCTA are compared, MDCTA detect more stenotic or occluded arteries in supra-popliteal, infra-popliteal, whole leg comparison. This results matchining with the current study results regarding occlusion and not matching with the current study regarding stenosis, this is mostly attributed to the small sample size.

In this study it was agreed that color Doppler and CT angiography is more available, easier, less costly and also can be done to almost all patients, in the other side MRA was not done due to high cost and cannot be done to patient with pace maker and metallic stent.

MDCT angiography of the aorta and lower-extremity arteries in this study demonstrates that the technique is highly accurate and has potential to substitute in most cases for DSA and MRA. As CT scan is generally easier to perform, more widely available, and can be obtained more rapidly than MRA and DSA. It is usually preferred in the emergent setting.

In this study the main limitation was the small sample size and that DUS and MDCTA findings were not compared with DSA, which is considered being the gold standard technique in detecting lower extremities PAD. However it was not done in this study because of its invasive nature. Therefore, this result may under- estimate the percentage of arteries with lesions that are actually detectable in patients with PAD. However, results of several studies report MDCTA as a non- invasive alternative to DSA.

## 5. Conclusion

Diabetes mellitus is a growing global problem. One of the major debilitating complications of diabetes is diabetic foot infection. Several risk factors affecting diabetic foot infection include, peripheral sensory neuropathy, foot deformity, trauma and improperly fitted shoes, callus, history of prior ulcers and amputation, prolonged elevated pressures, uncontrolled hyperglycemia, duration of diabetes, chronic renal disease.

The current study included 30 diabetic patients referred to Radiology department, Bab Al Sharia University Hospital and Private center. Twenty two of the patients were males represent (73.3%), and 8 were females represent 26.7%, the age of these patients ranged between 42 and 86 years. All patients will be subjected to Doppler ultrasonography and MDCT study.

All patients were type two diabetes mellitus with different disease duration (4 months to 18 years) with a mean duration 10.13 ± 5.12, 25 were hypertensive, 10 had coronary heart disease, smoking or history of smoking was 19. All patients had uncontrolled hyperglycemia with mean level 262± 70 mg/dl.

Fourteen patients had a unilateral side affection and sixteen with bilateral side affection.

The reported clinical presentation in the thirty patients includes rest pain in six (20%) patients, intermittent claudication pain in nine (30% ) patients, minor tissue loss "ulceration" in six (20% ) patients, major tissue loss in twelve ( 40%) patients.

Six (20 % ) patients had previous leg ulceration. Three (10 % ) patients had previous major amputation (above knee amputation).

In assessment of the agreement between Doppler and CTA regarding detection of patency, occlusion, stenosis, and occlusion with collaterals refilling reveal that: the number of stenotic segments was 38 (9.5%) and 42 (10.5 %) on MDCTA & DUS respectively, the number of occluded segments with distal collaterals refilling was 16 (4 %) and 16 (4 %) on MDCTA & DUS, respectively, while the number of segments with a total occlusion was 65 (16.2%) and 63 (15.7%). on MDCTA & DUS, respectively.

We conclude that medical imaging of the diabetic foot entails a variety of imaging modalities. The usage of CTA increases the ability for better delineation of vascular anatomy, it can visualize the arterial tree, localize the obstruction, assess the severity stenosis, detect the presence of collaterals and distal run off which helps in planning for management of peripheral arterial disease.

CTA scan is generally non- invasive, easy to perform, widely available, and can be obtained more rapidly than MR and DSA.

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