ORIGINAL ARTICLE

Comparison of Lower Limb Arterial Atherosclerosis by Doppler Ultrasound in Diabetic and Non Diabetic Patients

ARSHAD SALEEM SAHI[1], SAJID SHAHEEN MALIK[2], MIAN ABDUL WAHEED[3]

ABSTRACT

Aim: To compare lower limb arterial atherosclerosis in diabetic and non diabetic pts.

Materials: This cross-sectional descriptive study was performed in Cheema Heart & General Hospital and Al-Raee Trust Hospital Gujranwala, from tenth August 2017 to tenth February 2018. One hundred and twenty individuals were conveniently selected from the lower limb arterial atherosclerosis by Doppler ultrasound in diabetic and non diabetic patients. Doppler study was performed by high frequency probes (convex & linear) 5-11MHz Hitachi EUB-5500. Colour Doppler study was identified by colours in the vessels (present or absent or trickle flow). Spectral Doppler assessment was done by graphic presentation.

Result: 120 individuals included in this study of which 58 were diabetics and 62 were non diabetics. Regarding gender 23 males 19.2% and 97 (80.8 %) females . They were categorized in three age groups, maximum 73(60.8%) were enrolled from 35-60 age group. It was found that. only six diabetic patients out of 58 show atherosclerotic changes in lower leg arteries . On the other hand eight non diabetic patients out of 62 show atherosclerotic changes in upper leg Aretries.

Conclusion: It is concluded that diabetic patients show atherosclerotic changes prominently in lower arteries of leg on the other hand these changes were seen in upper arteries of the leg in non-diabetic patients.

Keywords: Arterial Atherosclerosis, Doppler Ultrasound and Diabetic & Non Diabetic Patients.

INTRODUCTION

Atherosclerosis is characterized by formation of atheromatous fibro-fatty plaque after injury to tunica intima. Atheroma occurs to different degrees in different parts of an individual's cardiovascular system esp leg arteries. In peripheral arterial disease, blood flow reduces slowly to legs or arms or the plaque can rupture causing embolism. Atherosclerosis often occurs long before the clinical symptoms become apparent. In the early stage Atherosclerosis mainly shows intermittent claudication however if disease exacerbates such as in association with infection and neural lesions, local gangrene may develop which gradually progresses to ulceration and ultimately amputation. Cigarette smoking, high sugar level, high blood pressure and hyperlipidaemia are major risks for peripheral arterial disease. Atheromatous formation tends to be well localized and usually occurs in the proximal or mid-portions of a given arterial bed. However Patients with diabetes generally present with more distal disease. About 2% of late middle age adults in Western countries have claudication[1] and each year in England and Wales around 50 000 patients are admitted to hospital with PAD and 15 000 will require amputation[2].

There are many factors which may influence the development of disease and, in general terms, the prevalence of peripheral vascular disease detected by non-invasive procedures is about three times greater than the prevalence of intermittent claudication[3].

DM is a leading health devastating condition in the whole world these days[4] with high prevalence in developing

nations[5] and with highest prevalence in pakistan[6]. DM has many late complications disturbing natural life style mostly due to vessel involvement[7].

Occurrence of Peripheral ischemia are higher (20 times) in diabetics with PAD than in non-diabetics[8,9]. More than 30% of diabetic patients have evidence of PAD, when > 40 years. PAD is a major risk factor in diabetic patients leading to leg amputation [10]. In DM patients early Diagnosis of PAD is high valuable to see high risk patients of subsequent MI or stroke and to treat PAD, causing disability and amputation[11].

So consistent investigation is necessary for better treatment to reduce the effect of comorbidities on the diseased person. Doppler Ultrasound is non-invasive, harmless, real time, cost effective high resolution in contrast to angiography which is invasive, time consuming and costly. So Doppler sonogram well accepted as a noninvasive imaging modality to be used for finding and grading the intensity of disease[12].

Patients with severe, limb-threatening ischaemia will normally proceed straight to arteriography prior to surgery, but patients who are not surgical candidates may have an ultrasound scan to see if there is any lesion appropriate for angioplasty, which may improve circulation and reduce the likelihood of amputation. At the other end of the spectrum, patients with atypical symptoms that might be due to ischaemia can be examined to exclude the presence of significant illness. Rationale of research is to find out the PAD and comparison of hazards between diabetic & non diabetic patients.

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[1]Sonologist, Cheema Hospital, Gujranwala
[2]Assistant Professor , University of Lahore, Lahore
[3]Assistant Professor Radiology, Gujranwala Medical College, Gujranwala
Correspondence to Dr. Arshad Saleem Sahi, Email:drarshadsaleemsahi@gmail.com, Cell No. 0300-6461612

METHODOLOGY & MATERIAL

The study design is Comparative, cross sectional in Cheema Heart & General Hospital and Al-Raee Trust Hospital Gujranwala. Whereas, the Study duration is 9

months having modality 3 D U/S examinations with high frequency linear and convex probes 5-11, Mega Hertz Hitachi EUB-5500. The study followed Simple Random Sampling technique of 120 patients, all diabetic and non diabetic patients with claudicating /ischemic legs. After taking informed written consent from parents / guardians of the patient, data will be collected through Performa before the imaging. Data collection sheet will be used to record the observed data. Questionnaire will be collected according to variables: Demographic data will be taken from the parents / guardians of the patients.

Questionnaire will be filled according to lower limb arterial atherosclerosis findings by Doppler ultrasound in diabetic and non diabetic patients

RESULTS

One hundred and twenty patients, comprising 58 (48.3%) diabetic and 62(51.7%) non diabetic were included in this study. Mean age in diabetic and non-diabetic group was 51.6±9.75 (35 to 82) and 49.19±8.81 (35 to 74) years respectively. The mean of all the individuals was 50.39±9.32 (35 to 82) years (Table 1). All the individuals have been categorized in three age classes. Group 35-60 years contains 73 (60.8%), group 61-75 contain 46 (38.3%) and group 76-85 year contain 1(0.8%) individuals, (Table 2). Frequency distribution of male and female gender out of total 120 patients was 23 (19.2%) and 97(80.8%) respectively (Table 3I). While frequency distribution of diabetics and nondiabetics were 58 (48.3%) and non-diabetics 62(1.7%) respectively. Cross tabulation of the gender and diabetes shows, out of 23 (19.2%) females, 13(22.4%) were diabetics, and 10(16.1%) were non-diabetics. Out of 97(80.8%) male, 45(77.6%) were diabetics and 52(83.9%) were non-diabetics (Table V and Graph IV). Frequency of clinical symptoms is shown as; Pain in both the legs at rest in 2 (1.7%), Diabetic foot (Lt) 2 (1.7%), and Pain Both Legs after exercise frequency of Dopler findings; Atherosclerotic changes Both Lower Leg arteries 4 (3.3%), Atherosclerotic changes Both Upper Leg Arteries 8 (6.7%), Atherosclerotic changes Lt. Lower leg Artery 2(1.7%), and 106(88.3%) were free of arteriosclerotic disease. Cross tabulation of Clinical Presentation and Diabetes is presented as; Athrosclrotic change in both the Lower Leg Arteries in diabetics was 4(3.3%) while in non-diabetic 0 but all the individuals having atherosclerotic changes in the lower legs were diabetics there was no nondiabetic one. But 6.9% of all the diabetic individuals were positive for Atherosclerotic changes in both the Lower. Atherosclerotic changes of both the upper leg arteries in diabetic individuals was 0 but 8(6.7%) were non diabetics. All individual suffering from atherosclerotic disease of the upper part of the leg were nondiabetic. And 12.9% of all the nondiabetics were involved in the atherosclerotic disease of the upper part of the leg. Atherosclerotic changes of the left lower leg artery with diabetes 2(1.7%), while 0 and 3.4% of the total diabetics were suffering from Atherosclerotic changes of the left lower leg artery. Non-atherosclerotic Disease 52(43.3%), but 49.1% of the total Non atherosclerotic Disease was diabetics, while 89.7% of the total diabetics were Nonatherosclerotic Disease. On the other hand, 54

(45%) were non-diabetics, and 50.9% of all Nonatherosclerotic Disease were nondiabetics, but 87.1% of all nondiabetics were Nonatherosclerotic Disease. Total diabetics and nondiabetics included in this study were 58(48.3%) and 62(51.7%) respectively.

Cross tabulation of clinical presentation and diabetes shows that Pain in both Legs even at Rest with diabetes was 2(1.7%) and without diabetes were 0. Left diabatic foot with diabetes 2(1.7%), and non-diabetics nil. Patients having pain in both legs after exercise with diabetes were 54 (45.0%) and without diabetes 62(51.7%), Cross tabulation of the Doppler Findings and Gender shows that Female with Atherosclerotic Changes Both Lower Leg Arteries were 0 and Male with Atherosclerotic Changes Both Lower Leg Arteries were 4(3.3%). And Female with Atherosclerotic Changes Both Upper Leg Arteries 1(0.8%) and male with Atherosclerotic Changes Both Upper Leg Arteries 7(5.8%).

Atherosclerotic Disease 21(17.5%), while male with No Atherosclerotic Disease 85(70.8%), There was a very weak relation between diabetes and atherosclerotic disease which was statistically nonsignificant with P-value 0.66 and Pearson's correlation coefficient r = 0.040. As shown in the (Table XI and graph VII).

Table I: Frequency of age

	Frequency	%age
35-60	73	60.8
61-75	46	38.3
76-85	1	0.8
Total	120	100.0

Table-II: Frequency of gender

	Frequency	Percentage
Female	23	19.2
Male	97	80.8
Total	120	100.0

Table III: Frequency of disease

	Frequency	Percentage
DM	58	48.3
Non-DM	62	51.7
Total	120	100.0

DISCUSSION

Atherosclerotic disease is the major cause of death in the world although significant work done in the management of risk factors[20]. Main cause for this is the ongoing epidemic of obesity-induced insulin resistance and type 2 diabetes[21]. Atherosclerosis is the hardening and narrowing, due to the deposition of fats around the artery walls[22]. Atherosclerotic disease disturb the flow of blood around the body, giving raise to serious complications[23]. Arteries carry blood from the heart to the rest of the body[21]. Innermost layer of Artery is called the endothelium or intima[25]. Atherosclerosis starts when the intimal layer becomes damaged, allowing the harmful type of cholesterol to build up in the artery wall[26,27]. Normal arteries have elasticity to overcome the excessive pressure exerted by heart and works as a shake absorber. With the development of arteriosclerotic disease this elastic activity of the arteries become effected. Ultimately all the pressure exerted by heart will be reached to the terminal

part of the arteries which results in arterial rupture[28,29]. There are numerous causes and predisposing factors of atherosclerotic disease, some most common of them are listed as; Hypertension. Hypercholestremia. High triglycerides, smoking and other sources of tobacco, arthritis, systemic lupus erythematosus or infections, inflammation of unknown cause, and Insulin resistance, obesity or diabetes.{Tölle, 2015, Kijani, 2017; Goliasch, 2018}·Researchers showed how DM drastically accelerates atherosclerosis, by promoting inflammatory process and slowing down blood streaming. Once agreed that arterial stiffness, appeared when hypercholestremia blocked arteries with plaques. Heart attacks and strokes happens When completely occluded. Now a days majority of the scientists are agreed that body's immune system response to fat deposition, is higher than itself build-up, produces the risk of heart attack[33, 34].

This possibility, mediated through epigenetic changes, may explain finding that improved glycemic control is most effective when started earlier in life compared with starting in patients with advanced type 2 diabetes and pre-existing cardiovascular disease. The prediction that the obesity epidemic will continue to accelerate the incidence of type 2 diabetes and its deadly consequence of atherosclerotic vascular disease over the next decades emphasizes the importance of further mechanistic and translational work in this critical area of biomedical research. Although few pts in our study but still we see a relation of diabetes with atherosclerosis as shown in table XI and graph VIII.

CONCLUSION

It is concluded that diabetic patients show atherosclerotic changes prominently in lower arteries of leg. On the other hand non-diabetic patients show these changes in upper arteries of the leg .As we have very small proportion of diabetic patients included in our study but we observed that there is a week relation between diabetes and arteriosclerotic disease which is statistically nonsignificant. If the sample size of the diabetic individuals is increased or followed for some period of time then more significant results are expected. If the duration of diabetes is correlated with arteriosclerotic disease, then it is expected that there will be strong correlation between them.

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